

The Mining Journal

RAILWAY AND COMMERCIAL GAZETTE

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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LONDON, SATURDAY, DECEMBER 29, 1877.

WITH SUPPLEMENT. PRICE SIXPENCE. PER ANNUM, BY POST, £1 4s.

MR. JAMES H. CROFTS, STOCK AND SHARE BROKER, AND MINING SHARE DEALER.
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10 Grogwin & Mer., £25½.	50 North Laxey, 6s. 9d.	10 Wye Valley, £23½.
10 Grogwin, £24½.	20 Pandora, 2s.	50 Yorke Peninsula, 6s. 6d.
10 Glyn, 9s. 6d.	10 Pateley Bridge, £23½.	
10 Glyn, 20s.	50 Penstruthal, 6s.	

* SHARES SOLD FOR FORWARD DELIVERY (ONE, TWO, OR THREE MONTHS)

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D'ERESBY MOUNTAIN (LEAD).—BUSINESS negotiated in these Shares.

JAMES H. CROFTS, 1, FINCH LANE, LONDON.

TIN SHARES—SPECIAL BUSINESS at close prices in Carn Brea, Cook's Kitchen, Dolcoath, East Lovell, South Condurrow, Tincroft, Wheel Agar, Pevor, Grenville, Uny, Wheel Kitty, and others.

JAMES H. CROFTS, 1, FINCH LANE, LONDON.

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SPECIAL BUSINESS in the above, and Fortnightly Accounts opened on receipt of the usual cover.

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RAILWAYS—HOME AND FOREIGN.

SPECIAL BUSINESS in the above, and Fortnightly Accounts opened on receipt of the usual cover.

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10 Charing Cross Hotel.	20 North Metropolitan Tram., £17½.
10 Devonport & Tiverton Brewery.	10 Parnson and Co., £23½.
10 Fore-street Warehouse, £24½.	20 Positive Life Assurance, 4s. 6d.
10 Holcomb Sack.	20 Royal Aquarium, £3 3s. 9d.
10 Hudson's Bay, £10½.	5 Weymouth and Channel Island Steam (offer wanted).
10 Langham Hotel.	30 Yarmouth Aquarium.
25 Lawes Chemical, £7 7s. 6d.	

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ESTABLISHED 1842.

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10 Argentine, £23½.	25 Flagstaff, 21s.	60 Port Phillip, 13s.
10 Birdseye, 17s. 6d.	30 Frontino, £2 11s. 3d.	50 Parys Moun., 10s.
10 Blue Tent, £23½.	50 Grogwin, 18s. 6d.	100 Penstruthal, 6s. 6d.
10 Bodidris, £23½.	20 Grogwin, £23½.	80 Rookhope, 21s.
10 Bodidris, £23½.	20 Grogwin, £23½.	20 Richmond, £23½.
10 Bodidris, £23½.	20 Grogwin, £23½.	20 Tanconville, £4 7s. 6d.
10 Bodidris, £23½.	20 Grogwin, £23½.	20 Van Consoles, 9s. 6d.
10 Bodidris, £23½.	20 Grogwin, £23½.	50 W. Tankerville, 17s. 3d.
10 Bodidris, £23½.	20 Grogwin, £23½.	10 West Chiverton, £14.
10 Bodidris, £23½.	20 Grogwin, £23½.	20 Wye Valley, £23½.
10 Bodidris, £23½.	20 Grogwin, £23½.	10 Wye Valley, £23½.
10 Bodidris, £23½.	20 Grogwin, £23½.	50 Yorke Peninsula, 6s. 6d.

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East Caradon	7½
East Van	3½
Exchequer Gold	4s. 6d.
Flagstaff	2½
Frontino	2½
Glyn	18s.
Gorsedd and Merlyn	5½
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Hingston	4s.
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Leadhills	4½

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15 Alltani, 4s. 6d.	40 Glyn, 9s.	100 Penstruthal, 6s. 6d.
25 Bodidris, 2s. 6d.	15 Hultafall, 13s. 3d.	80 Rookhope, 21s.
20 Birdseye Creek, 17s. 6d.	20 Hornachos, 17s. 3d.	10 Richmond, £23½.
30 Bodidris, 2s. 6d.	25 Hingston, 7s. 6d.	5 Roman Grav., £7 15s.
50 Chontales, 11s. 9d.	40 Last Chance, 17s. 6d.	50 S. Roman Grav., 7s.
60 Cambrian, 13s.	25 Llanrwst, 35s.	15 Tankerville, £4 7s. 6d.
30 Chicago, £2 2s. 6d.	15 Leadhills, £2 16s. 6d.	50 Teoma, 6s.
80 Don Pedro, 8s.	25 N. Quebrada, £2 7s. 6d.	40 Van Consoles, 10s.
15 East Lovell, 15s.	40 Nth. Laxey, 6s.	10 W. Craven Moor.
30 Colorado, £2 18s. 9d.	40 New Zealand Kap., 15s. 3d.	25 Wye Valley, 23½.
30 Cornado, £3 5s.	40 New Zealand Kap., 15s. 3d.	
20 Derwent, £2.	£1 3s. 6d.	
15 Eberhardt, £7 10s.	25 Marke Valley, 17s.	
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20 EAST VAN..... do	15 ST. HARMON..... do
15 GLENROY..... do	20 SOUTH CONDURROW..... TIN.
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Lectures on Practical Mining in Germany.

CLAUSTHAL MINING SCHOOL NOTES—No. LVI.*

BY J. CLARK JEFFERSON, A.R.S.M., WH. SC.,

Certificated Mining Engineer.

(Formerly Student at the Royal Bergakademie, Clausthal.)

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SECTION III.

For carrying the Kinatomon drill a patent carriage has been designed. This consists of a low cast-iron frame, or plate, supported on four small wheels. To a horizontal circular plate, pivoted and resting on this frame, a quadrant, the arc of which is provided on the outside with teeth, is attached in a vertical position. The plate and arc can thus be rotated about a central vertical bolt in the carriage. On the centre about which the arc of the quadrant is struck a pair of strong wrought-iron plates are hinged, or centered, and project one on each side of the quadrant, to about twice the length of the radius of the quadrant, the two extreme ends being connected by a strong pin or bolt over which the clamp of the drill is slipped. A small cogwheel is centered on a short cross spindle between the two side plates, or arms, carrying the drill, and gears into the teeth on the quadrant. By means of a handle fitting on the squared projecting end of the spindle the cogwheel can be rotated, thus raising or lowering the arms carrying the drill.

The chief advantages claimed for the Kinatomon are that it is shorter, lighter, and simpler in construction than most other rock drills. It requires the turning of only one instead of a number of set screws to fix it in position at any angle, and it may be fed 3 in. out of stroke without stopping the working of the drill. Its rate of progress in granite, gneiss, whinstone, &c., is said to vary from 3 in. to 1 ft. per minute. The larger machines are constructed to drill up to 3 in. diameter, and a properly tempered steel drill should bore about 10 ft. without requiring re-sharpening. In hard granite, and with a pressure of 45 lbs. to the square inch, is said a rate of a in. per minute can be relied on.

The next form of rock drill which claims our attention is the Ingersoll, brought out and patented in Europe by Messrs. Le Gros and Silva, of London. The principal characteristics of the Ingersoll drill are that the whole of the motions connected with the machine are performed in an automatic manner, more especially that which concerns the gradual feeding forward of the cylinder as the hole gets deeper; and this takes place and is solely dependent on the previous amount of penetration; so that this rock drill can accommodate its feed to the varying hardness of the rock to be drilled through. And, besides, the stroke of the piston gives a dead blow on the rock, as the steam, or compressed air, is not cut off till after or at the same time as the blow is struck. The construction of the cylinder is such as to give an effective cushioning of steam or compressed air if the piston makes a stroke beyond its regular length, thus preventing the possibility of the piston striking the cylinder covers. The piston is extremely long, about three to four diameters, and the piston rod, which projects through the front cylinder cover, and carries the borer, is about three-fourths the diameter of the piston. The valve is an ordinary slide valve; the valve spindle, however, is worked by a tappet motion, which consists of two very short levers, hinged at their centres, the one arm of which gears against the valve spindle, whilst the other projects slightly within the cylinder. The two ends which project within the cylinder are struck alternately by the piston, thus reversing the valve, and bringing each tappet successively forward into position to be struck by the piston. In a recess formed at the lower end of the cylinder on the opposite side to the valve chest is a third tappet, centred on a spindle, which passes steam tight through the cylinder, and carries on its end outside the cylinder a second short lever, or tappet, which hangs in a vertical position. This outside tappet is held between a small fork, attached horizontally to a long vertical spindle passing upwards. The tappet inside the cylinder after being struck by the piston is brought back into position by a small spring, thus giving the vertical spindle a partial reciprocating rotatory motion. At the upper end of this vertical spindle a horizontal arm carries a pawl, which works in a ratchet wheel, or collar, attached to the top cylinder cover, which is tapped, and forms a nut through which the feed screw passes; this latter being attached by means of a collar to a curved arm or bar bolted to the head of the frame. The end of the screw is filed square, so that a handle or winch can be slipped over the end, and in this manner the cylinder borer, &c., readily withdrawn from the bore hole when it is required to change for a fresh borer, &c. The frame which carries the cylinder, and to which the strap for carrying the feed screw is bolted, forms a semi-cylindrical or semi-ellipsoidal shell, provided with internal V-shaped projections, which fit into corresponding external grooves on the cylinder. The tappet for actuating the feed motion is placed about 3-16ths of an inch nearer the front end of the cylinder, so that if the penetration of the drill is less than this distance between the feed and the lower valve tappet the piston fails to strike the feed tappet, and no further forward motion of the drill takes place. The gradual rotatory motion of the borer after every blow is performed by a spiral or refilling arrangement; this consists of a rifled round steel bar attached to the top cylinder cover by a grooved collar, the round cylindrical end projecting through the cylinder cover is provided with a ratchet wheel, a pawl fixed to the cylinder cover allows the ratchet wheel and rifled bar to rotate in one direction only. The back end of the piston and piston rod is made hollow, and fitted at the end with a nut corresponding to the spiral of the rifled bar which projects into the piston. The bar is provided with eight spiral grooves of 7 ft. pitch. On the down stroke of the piston the frictional resistance which opposes the rotation of the piston and piston rod is greater than that opposing the rotation of the rifled bar, so that the latter rotates slightly during the downward stroke, during the back stroke, however, the pawl and ratchet wheel prevents the rifled bar from rotating, so that the piston and piston rod and borer are compelled to rotate during the upstroke. The stroke of the piston and the pitch of the spiral are so proportioned that the cutting tool makes a complete revolution per every twelve blows.

The Ingersoll rock drill is made in various sizes, the smallest having a 2½-in. cylinder and 3½-in. stroke, and weighs about 170 lbs., and will bore from ½-in. to 1½-in. holes to a depth of 10 ft. In very hard trap rock it is said to drill a 1-in. hole 3½ ft. deep per hour, with about 800 blows per minute. The largest size weighs about 820 lbs., and has a cylinder 5 in. in diameter, the stroke varying between 5½ in. for very hard rock and 8 in. for the softer kinds, the bore holes varying from 1½ to 5 in. in diameter, and may be carried to a depth of 40 ft. The machine works at the rate of about 400 blows per minute, and with a 3½-in. hole will average 2½ ft. per hour in the hardest trap rock. At the St. Helier's Harbour Docks, Jersey, the Ingersoll carried a 3-in. bore hole 14 ft. deep in 10 hours.

For sinking purposes the Ingersoll is carried on trunnions on a tripod stand, the legs of which are telescopic, so that they can be lengthened or shortened. The trunnions carry a circular hollow disc or plate, in which a turned boss cast on the frame carrying the cylinder fits, the two being connected by a strong bolt or pin. This arrangement constitutes a universal joint, so that the drill can be fixed at any inclination desired. A gadding car or carriage has been designed for carrying the Ingersoll drill when used in quarry work. This consists of a flat cast-iron bed plate mounted on four wheels, and having at each corner a socket in which a pointed bar can be fixed by means of set screws; these four pointed bars may thus be made use of as legs, on which the machine rests more firmly than on the wheels alone. On the bed plate a vertical triangular casting is bolted, having a front planed face, on which a face plate slides in grooves, and can be clamped at any height. The face plate carries the drill; by means of a chain attached to the face plate, and

which passes over a pulley fixed at the top or head of the triangular standard, and down to a drum or winch provided with a ratchet wheel, pawl, and handle the drill can be readily raised and lowered.

For very heavy work, such as tunnelling, &c., where it is desired to have several drills working at the face at once, a special railroad or tunnelling car has been designed and manufactured in two sizes, the smaller for carrying two drills, weighing nearly 1½ ton, and the larger one for carrying up to eight drills, weighing nearly 3 tons. The car is mounted on four wheels, and carries at its back end a casting in which a long screw fits, which latter can be tightened against the roof of the tunnel. This casting has three large holes placed vertically above one another, through any one of which a strong pin can be passed. On this pin a long arm is pivoted, having a small forked end where it is pivoted to the car, and a broad forked end, which carries a long bar, on which the drills are mounted. This end of the arm carries a long screw, which can be tightened against the roof. The centre of the arm carries a swelling, in which a nut is fixed; through this nut a screw passes, so that on rotating the latter the long arm is raised or lowered. A cast-iron slot sector which is bolted to the carriage, and formed in two halves, one passing upwards on each side of the arm, serves as a support to which the arm can be clamped, by means of a bolt passing through a corresponding hole in the arm and two washers, so that when the bolt is tightened up the arm is firmly clamped to the sector. This drill has been extensively used in Europe and America, having been awarded the medal of the American Institute.

The last form of percussive drill which will claim our special attention is that invented by Mr. J. Darlington. This machine is designed to have as few moving parts as possible, and to do away altogether with the great objections that usually attach to tappet motions. There is no valve or valve motion in the ordinary sense of the word in this drill, which consists essentially of the cylinder and piston alone. The steam or compressed air pipe is fixed to the front end of the cylinder, which is always filled with compressed air. The piston and piston rod are forged in one piece; the diameter of the piston rod is about three-quarters that of the piston, the borer being fastened to the front end of the piston rod in the following manner:—The extreme end is filed down for a short distance to afford a flat seat for a washer beneath a nut. In a plane at right angles to that of the flat seat a square hole or slot is drilled or slotted out, and a piece of steel forged to the same size to fit the slot is inserted; the end of this piece of steel ends in a short screw, over which the washer and nuts pass. Whilst the piece of steel is in its place a hole is drilled to receive the end of the borer or cutter, the end being made hemispherical so as better to receive the shock or blow. It will be thus seen that when the borer is inserted and the nut tightened up the cutting tool is readily and firmly secured in its place. The compressed air, as we have just mentioned, always fills the lower end of the cylinder, and consequently presses against the annular portion of the piston, the forward blow being made in consequence of the greater total pressure on the back of the piston. The piston is nearly of the same breadth or length as the stroke. An equilibrium port, or rather a communicating port, extends about three quarters the length of the cylinder at the back portion of the cylinder, one of the entrances of the port into the cylinder being situated close to the back cylinder cover, and the other at about one-half the length of the stroke from the front end of the cylinder. This port only communicates with the two ends of the cylinder.

To commence with, let us imagine the piston is just having completed its forward stroke. The compressed air, communicating always with the front end of the cylinder, begins to drive the piston back, which at present covers the lower entrance of the equilibrium port; when the piston has traversed about one-half of the return stroke it uncovers the lower entrance of the equilibrium port, and the compressed air rushes along the equilibrium valve to the back side of the piston and the total area, and consequently pressure on the back of the piston, which is greater than that on the front annular portion, gradually arrests its motion, and then drives it forward towards the bore hole, the piston during this forward stroke cutting off the compressed air itself by covering the lower of the entrances of the equilibrium port. It will be at once evident that the piston completes the remaining portion in virtue of its momentum, and the expansion of the compressed air at the back against the pressure of the compressed air on the annular space at the front side of the piston. Just before completing the stroke the piston uncovers the exhaust port, which should be of comparatively large area. It might at first sight be supposed that the retarding effects of the pressure on the front end of the piston would reduce considerably its effect; it is, however, simply a matter of properly proportioning the diameter of the piston rod (which extends only on the front side of the piston) to that of the piston, so as to make the total pressure on the back of the piston even when reduced by expansion greater than that on the front end up to the instant of the uncovering of the exhaust port. Suppose, for example, that the piston is 4 inches in diameter, and the piston rod 3 inches in diameter, and that the length of the stroke is 6 inches, and that the lower entrance of the equilibrium port is just covered by the piston when it has completed one-half of the forward stroke, and besides that the drill is worked at a pressure of 40 lbs. to the square inch. Then the total pressure on the back of the piston is 500 lbs., and that on the annular space on the front side of the piston 220 lbs., giving an excess of 280 lbs., driving the piston forward during the forward stroke. As soon, however, as the piston closes the entrance to the equilibrium port the steam or air begins to expand behind the piston, and consequently the total and initial pressure on the back of the piston becomes less, and at the end of the stroke, just before the uncovering of the exhaust port, the compressed air occupying twice the space has only half the original initial pressure—about 20 lbs. to the square inch—and the total pressure on the back of the piston, just before the completion of the stroke, will be a little above 250 lbs., which we see is thus still 30 lbs. in excess of the total pressure constantly acting on the front end of the piston.

The mechanism is very similar in principle to that we have learnt in the description of the Ingersoll. It consists of a rifled or spiral bar having three grooves, the head of the bar being fitted with a ratchet wheel recessed into the back cylinder cover. Two pawls or ratchets likewise recessed into the cylinder cover are kept pressed against the ratchet wheel by spiral springs. They prevent the rotation of the drill bar only in one direction. The back end of the piston is provided with a round hole in which the rifled bar can slide. The front end of this hole has a steel nut inserted which accurately fits the grooves in the rifled bar. During the back stroke two pawls prevent the ratchet wheel and bar rotating in the direction in which the piston tends to rotate them, and hence, during the back stroke the piston, piston rod, and cutter are compelled to rotate; during the forward stroke, however, the form of the ratchet teeth permit the latter to rotate, and as the friction which opposes the rotation of the rifled bar and ratchet wheel is less than that which opposes the rotation of the piston rod, &c., the latter do not rotate at all during the forward stroke.

The gradual forward motion is produced by hand by means of a long screw and a nut attached to the cylinder. If the machine be fed forward too fast it will stop working in consequence of the piston not coming sufficiently far forward to uncover the exhaust valve. The Darlington rock drill is mounted on a bar by means of an ordinary universal joint. This machine is, perhaps, the simplest in construction of any rock drill yet brought out; this simplicity, however, is obtained at the sacrifice of the automatic forward feed of the cylinder as the hole gets deeper, and consequently requires greater attention on the part of the attendant workman. With a pressure of 40 lbs. to the square inch the Darlington works up to a speed of 1000 blows per minute; the total length of the machine is between 35 in. and 40 in., the piston 3½ in. in diameter, the piston rod 2½ in. in diameter, and the maximum stroke 4 in. The total weight of the machine is about 100 lbs., that of the striking mass (a piston, piston rod, and cutting tool) 35 lbs.

GEOLOGICAL TIME.—At the last meeting of the Royal Society the Rev. Samuel Haughton read a paper on a new method of finding limits to the duration of certain geological periods. He had previously shown how he came to the conclusion that the elevation of

Asia and Europe displaced the axis of maximum inertia through 69 miles. The axis of rotation being thus separated from the axis of figure by 69 miles, or 1°, began to revolve round it. But for friction this would continue forever, and the object of the paper was to discuss how long would be required for friction to bring the axis of rotation to again coincide with the axis of figure. The friction is that of the ocean which always tends to revolve round yesterday's axis, until compelled to revolve round to-day's axis by friction against its bed. The calculations brought out the result that 641,000 years would be required to restore the coincidence of the axes, and, therefore, the formation of Asia and Europe cannot be more recent. Further calculations gave the minor assignable limit to geological time as 11,000,000 years in round numbers.

THE EMMA MINE.

The renewal of shipments of ore from the celebrated Emma Mine will naturally cause all who are or have been shareholders in the now almost defunct English company formed for working it to consider anew the value of the property they so thoughtlessly threw away. Throughout all the clamour as to the alleged deception practised in the transfer of the mine to the English shareholders, as well as since it has invariably been asserted in the *Mining Journal* that if any reliance was to be placed in the opinion of practical miners who had visited the property, but were peculiarly disinterested in the result of the working, the Emma was unquestionably a good mine, and worthy of development. That the English paid a large price for the mine is admitted, but that price was known to the whole world before the public invested one penny, so that the capitalists who speculated were like children who spend their money in coveted toys, then cry because the money is gone, and smash the toys to vent their spite. As the London Emma shareholders have now neither the capital invested nor the property they can dispassionately consider their position, and estimate the advantages as compared with rashness and the love of litigation. From the time the Emma Mine passed into the hands of the English company exploration (the one thing necessary to secure permanent profits in mining) was entirely neglected, and a system of careless management was carried on which in a few months would bring into the winding-up courts even such properties as the Cape Copper, Linares, Fortuna, Pontgibaud, and others equally successful. The London Emma shareholders appeared to suppose that even ordinary business energy and judgment were unnecessary, and that nothing had to be done but receive the periodical dividends for ever. Such marvellous benefits are not secured in mining any more than in other business.

And the puerile simplicity of the shareholders is the more apparent when it is considered that the fact that the property was being ruined by bad management in the shape of neglect to provide for the future was well known to the shareholders long before it was too late to retrieve their position, and when even a small outlay upon exploratory work would have made the Emma property rank at least with the Richmond or any other American concern on the English market as a permanently profitable undertaking. Foremost in his reiterated assertions that the Emma was being crippled through inattention to development was an esteemed correspondent of the *Mining Journal*—Mr. Henry Sewell—and the few of his facts re-published last week suffice to show how small a drag upon the returns from the mine would have sufficed to do all that was necessary. Well may Mr. Sewell wish the readers of the *Journal* to be reminded how often he requested Mr. A. MacDougall to accept the 50,000*l.* offered to the English shareholders by Messrs. T. W. Park and Albert Grant to work the mine. It should be remembered that this sum was only to be returned in case the mine paid for it—that is, three-fourths of the net proceeds were to be for the English shareholders, the remaining one-fourth to be devoted to the payment of the 50,000*l.* Mr. Sewell thinks there is no doubt that the shareholders have been badly directed in their law-suiting business; and he mentions that he predicted to Mr. MacDougall that he would never gain this suit in America, which was a greater reason that the 50,000*l.* should have been accepted.

The character of the rock in which the Emma Mine is situated rendered exploration of even more than usual importance; and hence Mr. Sewell remarked in his pamphlet on the Emma (published when there was still time to have avoided the subsequent litigation, which very properly deprived the company of the mine altogether) that, owing to the geological features of the district, and especially the nature of the rock between which the ore body was found—stratified limestone—the future prospects, assuming ore to continue, would entirely depend upon the due working of the mine, so as to have proper reserves, and the due arrangements for development, such as provision for ventilation, and proper machine power for pumping and for raising the ore, and thus pushing on of exploratory works, so as to find further bodies of ore both horizontally and towards depth, as the then existing ore body in the deepest part of the mine showed signs of compression, and so might be expected soon to be reduced, and to go off to a mere thread. Mr. Sewell was well aware that limestone formations, such as are found at the Emma Mines, and in which he had some years' experience in Spain, Chili, Peru, and Mexico, and in which some of the richest ore bodies have been found, were often affected by such compressions, but so long as there was a continuance of the vein, however thin, there was a fair prospect of its again opening out, and producing as valuable a body of ore as was then being worked. He mentions that even in the celebrated Potosi Mines, which for 246 years yielded the Spanish Government 800,000*l.* per annum as royalty, the veins were constantly being affected by these compressions, varying from several yards to the thickness of a penknife blade.

It is but justice to Mr. Sewell to state that his views appear to be now receiving full confirmation, although at the time he wrote they were ignored, from the circumstance, probably, of his opinion being diametrically opposite to those of Mr. Warren Hussey, one of the original vendors and a large local shareholder; of Mr. Silas Williams, the mine agent; of Mr. George Attwood, the mine manager; of Mr. Clarence King, a celebrated American geologist; Prof. Murray, a mineralogist; and Mr. John Longmaid, a mining engineer who condemned a neighbouring mine as containing no ore worth raising, though the succeeding proprietor quickly raised 2000 tons of silver-lead ore, and continued to turn out regularly 300 tons per month with good profit. That Mr. Sewell wrote from actual knowledge, and not from mere hypothesis, seems evident, since in July, 1872, he made an affidavit in one of the local courts that the Emma was a bed vein, and that it would be proved to be the same as the Flagstaff, Vallego, and several other mines in the district. The correctness of this has now been proved by subsequent events, for the Emma bed vein is continuous for about 10,000 ft., and is not an isolated body of ore, as was supposed by some. Upon these facts Mr. Sewell very reasonably argued that the length of the Emma vein having been proved by actual work of the mines that are situated on the same vein for a distance of 10,000 ft., such as the Flagstaff, Vallego, and others, to be a master vein, it is but reasonable to suppose that new ore bodies will be found in depth as well as in length, as already stated. Mr. Sewell explained that the Emma at the time he examined it exhibited distinct and marked characteristics of a well defined segregated strata vein; the footwall has a regular pitch into the hill of about 45°, and a course in a north-westerly direction, corresponding with the footwall found in the Flagstaff Mine, which development will, in his opinion, prove to be identical with that of the Emma. The accuracy of Mr. Sewell's views will certainly add to his already high reputation as a mining engineer, and although the Emma has been lost to the English capitalists a compensation may be found in the neighbouring mines which are still in English hands.

HOLLOWAY'S OINTMENT AND PILLS.—Though it is impossible, in this climate of changing temperature, to prevent ill-health altogether, yet its form and frequency may be much mitigated by the early adoption of remedial measures. When hoarseness, cough, thick breathing, and the attending slight fever indicate irritation of the throat or chest, Holloway's ointment should be rubbed upon these parts without delay, and his pills taken in appropriate doses, to promote the curative action. No catarrhs or sore throats can resist these remedies. Printed directions envelope every package of Holloway's preparations, which are suited to all ages and conditions, and to every ordinary disease to which humanity is liable.

* Reprint Notes on a Course of Lectures on Mining, delivered by Herr Berggrath, Dr. von Gneib, Director of the Royal Bergakademie, Clausthal, The Harz, North Germany.

DESERT OF ATACAMA—No. II.

ON THE RECENTLY DISCOVERED NITRATE DEPOSITS IN THAT PART OF THE NORTH OF CHILE WITHIN THIS DESERT.

(Extracts translated from Notes of a Commissioner sent by the Chilean Government.)

"SALITRERAS," OR NITRATE DEPOSITS.—The deposits of nitrate of soda, or "salitreras," as they are commonly called, are spread over the more central parts of the desert from 26° 30' to 24° south latitude. They are situated at the heads of the plains that disembody into the large hydrographic hollows, or into other plains, so shut in on all sides that they appear to have been the sites of former inland seas or large lagunes. They are only found at certain distances from what appear to have been the water-courses of ancient streams; and both in the valleys and in the plains the heaviest deposits are found, not in the centre of any hollow or depression, but on the slopes of the low hills that circumscribe them. This position of the more abundant deposits appears to be due to the great solubility of the nitrate of soda. In the lower parts, where the waters must have accumulated, they would have been in sufficient quantity to dissolve the nitrates, and in sufficient force to convey them by infiltration to unknown depths. The situations in which nitrates may be found can be recognised by certain signs, and present themselves under two different aspects. Those called "salares" are easily known by the quantity of common salt that appears on the surface. This superficial cover of salt forms rounded masses full of cavities, and composed, besides salt, of sulphates of soda and of lime, mixed more or less with other matters. It is below this covering of salt that the nitrates are found, generally in strata or layers, whose thickness varies from 4 to 20 in., of a dark colour, a porous structure, and always mixed with a certain quantity of the soil of the desert.

The central parts of these salares are always poor in nitrates, it being only in their banks or internal slopes that cleaner or richer deposits are found. In the other class of salitrera the nitrates do not appear on the surface, this being composed of a stratum of earth with small stones that hides them from view; nevertheless, there are certain signs of their existence beneath their earthy covering. The first of these is the existence here and there in the superficies of small natural holes, which appear, especially in the lower parts, in any depressions where the waters may have collected and dissolved the nitrates. On the disappearance of the nitrates the ground would naturally sink down and remain full of holes. The other sign is the numerous small fissures observable on the surface, cutting each other in all directions that divide it into polygons, that remain naturally etched out, as these fissures become filled with the coarse sand and angular stones of the desert. This singular aspect is the result of the shrinkage in bulk of the masses of nitrate on their crystallisation into prisms having extended to the surface. The presence of calcedonies has also been taken for a sign of the existence of nitrates, and doubtless they are found in quantities in many salitreras; but, on the other hand, there are many others in which none appear, and taking into account the origin of the calcedonies above noted it will be seen that they have no connection with the existence of nitrates. Underneath a layer of ground, varying in thickness from 4 to 8 in., there is a compact stratum formed principally of gypsum and small stones, to which the workmen give the name of costra, or crust. Its thickness generally varies from 8 to 16 in., and it is below this crust, or costra, that the nitrate of soda is found. This latter appears in irregular strata, whose thickness varies from 6 to 8 in. up to one of 6 ft. or more; a like irregularity is observable in the quality of the nitrate. In one part of a deposit it appears compact, and mixed only with common salt and sulphate of soda, whilst in another part of the same deposit it is found mixed with a more or less quantity of other extraneous matters also. Below the nitrates are found at times other strata, similar in composition to that of the crust, or "costra," whilst others again rest on rocks similar to those of which the circumjacent hills are composed. In the latter case the nitrates are more pure than when they rest on strata of gypsum and sand.

Of the deposits of nitrate yet known the nearest to the sea is the one situated near the watering-place (or oasis) of Cachiuyal. It begins about 4 miles to the south-east of that watering-place, and reaches as far as the mountain of Hornillo. It is situated on a rather low sloping plain that raises itself up to the west of the ancient river of Cachiuyal, and forms a narrow band of nearly 5 miles in length by 55 to 66 yards in width. It is in the middle of this long strip that the nitrate of this deposit reaches its greatest thickness of about 1 yard, but this gradually diminishes as it leaves the centre. The nitrate is of a yellowish colour, contains much salt, and its ley of soda nitrate does not pass 25 per cent. Going on thence to the north-east, and at about 16 miles from the above-named watering-place of Cachiuyal, we come to the Salitrera of Gonzales. This is situated in a small depression, surrounded by the low hills that make their appearance on the north of the road to Cachinal de la Sierra; this deposit of Gonzales is of small extent, and very irregular, but contains nitrate of good quality, although much mixed with a peculiar class of sand, it rests directly on the porphyritic rock, in which it forms a kind of lodes or veins. Continuing to the north-east we come to a high tableland covered with calcedonies, after traversing which we arrive at the Salitrera del Barón, situated some 7½ miles from that of Gonzales. This deposit—Del Barón—has been but little explored; in a hole 1 yard deep the nitrate is seen overlaying the porphyritic rock, into which it appears to penetrate a few inches; the nitrate is mixed with sand in proportions varying from 20 to 35 per cent., it is white and very pure, the soluble parts give a ley that passes 45 per cent.

The Salitreras on which most has been done in the way of exploration are those of the company of Callejas, Guzman, and others; they are situated north of those of the Barón, at a distance of about 10 miles. They occupy an extensive plain shut in by an embankment of low hills, whose centre appears to have been occupied by a lake. In this central part only a thin stratum of nitrate is found, but on approaching the banks or hills the deposit assumes an appearance of much greater importance. On the southern part, thanks to the numerous holes made there, its thickness can be seen and estimated, it always exceeds 1 yard, and at times reaches to 2 and 2½ yards. The nitrate is very compact, of a yellowish tint, containing much salt and sulphate of soda, and its ley, taken from several samples, varies from 23 to 30 per cent. of nitrate of soda. This deposit rests on a rather hard substratum of gypsum, with small stones. The more northern allotments known by the name of Tercera (or third) Salitrera contain the same class of nitrates, but the bed, or stratum, is thinner, and scarcely exceeds 1 yard. As far as has yet been seen it rests on the same rock as the former one, and at times on a decomposed porphyry, and it is noticeable that in the latter case the quality of the nitrate improves.

After having passed the ridges of low hills that shut in on the north the second and third Salitreras, we arrive at another and very extensive plain, in which has ultimately been discovered a new deposit; this, as yet, has been only very partially explored, principally in the western part of the plain. The situation and the class of nitrates have a perfect analogy with those of the Barón; as, in that Salitrera, the nitrate is mixed with a certain quantity of sand, but it is of superior quality, containing but little salt or sulphate of soda, and its ley is more than 40 per cent.

Finally, eastward of these Salitreras (or Salares) in the direction of Cachinal de la Sierra two other deposits are found. La Descubridora de Banados, distant about 15 miles from the watering place, is situated in a plain of some 7 miles in length by 2 miles in width. The layer of nitrate has been explored in some parts carrying a thickness of about 1 yard; the nitrate has a red tinge, sufficiently pure, as two samples have given a ley of 38 to 42 per cent. The other deposit, known by the name of Primera Salitrera de la Compañía de Guzman, is much less important, by no means extensive, and situated among some low hills, or slopes, to the south of the Descubridora de Banados. Few works of exploration have been undertaken, so that it is difficult to form any exact idea of its importance; in some excavations nitrates have been found, in others sulphate of soda alone. Such are the Salitreras of Cachinal.

The difficulties of all kinds, and the scarcity and cost of labour, have not allowed the completion of the explorations necessary to judge of the importance of these deposits. Generally speaking, the discoverers limit themselves to the attainment of a view of the

nitrates without caring to ascertain their thickness or their quality, still less those of their surroundings; while, on the other hand, the great irregularity of these deposits make much labour and expense necessary to form any tolerably correct estimate of the quantity and quality of the nitrates that may exist therein. But from the general result of the few observations yet made two facts are apparent: First, it is evident that the richer part of a deposit is not to be met with in the centre thereof, but ought rather to be looked for on the slopes of the low hills or embankments that usually enclose the hollows or plains on which these Salitreras are located. In ignorance of this, the workings of the discoverers have frequently been badly directed, and have left the most important parts unexplored. The second fact is the great extent of ground occupied by these deposits, which begin to appear at the foot of the eastern slope of the Cordillera of the coast, and extend to the foot of the western slope of that of the Andes, occupying, apparently, all the low plains and hollows of this extensive interior.

SALITRERAS OF AGUAS BLANCAS.—In latitude 24° 6', and 40 miles in a direct line from the coast, there commences an extensive salar, which reaches on the south to the plain of Aguas Blancas, and thence passing around a range of low hills, extends towards the east to a place called Las Cuevitas (the caves), or Agua Dulce, occupying a space of 23 miles from east to west, by 10 miles north to south. Underneath a layer of salt that covers the surface of this salar nitrate of soda is found in strata or beds of 4 to 8 in. thick, somewhat impure, and mixed with earth, salt, and sulphate of soda; but on the borders of this salar the layers of nitrate reach a thickness of from 20 in. to 2 ft. at the same time that it becomes more compact, so much so that samples taken from such excavations have given a ley of 23 per cent. The deposits of this region may be said to be as yet unexplored, though there is evidence of an improvement in the quality of the nitrates in the southern part, as also towards the south-east in the direction of the Cordillera de Varas; this is the part that presents the best aspect, as it is a known fact that these salares contain few or no nitrates in their central part, and those few of poor quality, whilst on their borders or margin (in this case towards the south and south-east) rich deposits may be anticipated, and towards those parts should the exploration be directed.

ORIGIN OF THE NITRATES.—Some considerations on the origin of these nitrates of soda are not out of place here, as they disinvolve consequences that may facilitate further discoveries. The presence of common salt or chloride of sodium in all these salitreras, the existence of this substance covering extensive plains, as in the example of the salar of Aguas Blancas, establishes a certain relation or correspondence between the sea and these deposits, and leads us to place them in the category of ancient marine formations. But if we study with more attention the situation of these Salitreras, as also the substances that they contain besides the nitrates, if we note that in none of them does there exist either calcareous formations or stratified rocks, as would have been the case had they been deposited in any ancient bay, and ultimately that in no one of them have any vestiges of sea shells been found, we come to the conclusion that the only analogy between these nitrate deposits and marine formations is the presence of salt; moreover, in many parts the nitrates are mixed with small stones, whose presence precludes all idea of a deposit formed slowly in the midst of seas, or salt lagunes, and by their evaporation. The nitrates, in lieu of occupying the lower parts of any district, always affect the slopes of the hills, and at times are found on mountain plains, as may be seen at the mines of Paposo, or even on the Cordillera of Marigunga, fully 15,000 ft. above the sea level, where nitrates of soda are found. It is, therefore, evident that their origin is altogether local, that they have not been transported from elsewhere, but formed *in situ*. Let us, therefore, endeavour to find out whence the elements that constitute nitrate of soda proceed, as also those of the other substances that always accompany them, as sulphates of soda, lime, and chlorides of sodium. The constituent elements of these are lime, nitric acid, sulphur, and chlorine. All these Salitreras are found surrounded by hills composed of felspathic rocks, and the sand that covers the plains and slopes of the hills is composed of the same elementary material. The felspars that form these rocks are the labradorites, the Albites, and the oligoclases. The labradorite contains a quantity of lime, the Albite from 8 to 10 per cent. of soda, and the oligoclase both soda and potash. Thus there exist in this rock the bases of the salts that are found in the Salitreras, the acids alone are wanting. All the rocks contain pyrites, which on oxidation may have supplied the sulphuric acid.

It is known that chlorine is always produced in quantities in volcanic emanations, and that the waters that spring from the midst of Trachytes contain quantities of chlorides. To account for the formation of nitric acid appears at first sight difficult, but the experiments of Cloes have established to a certainty that the alkaline carbonates, when in the presence of oxidisable substances, possess the property of condensing the elements of the atmosphere, and transforming them into nitric acids. If what was stated above regarding the rapid decomposition of the rocks of the desert be borne in mind, it will be easy to comprehend the formation of nitrates and their situation at the base of the hills. The rocks gradually moulder away, and are reduced to a coarse sand on the slopes of the mountains, which the few but heavy showers of the desert carry down to the plain. This felspar sand undergoes the decomposition above indicated, and is reduced to an earth composed of kaolin, mixed with sulphate of lime, chloride of sodium, and carbonate of soda; this last is in its turn converted into nitrate, and when other showers fall the soluble salts are carried by infiltration to the bases of the hills, whilst the sulphates of lime, much less soluble, remain mixed with the kaolin. This layer of sulphate of lime and clay that forms the crust of the nitrate beds is found not only on the plains, but often near the summit of the hills, and wherever the superficial sand of the desert is removed, a white porous substance is found, composed principally of sulphate of lime. When the waters of infiltration evaporate the salts that they held in solution crystallise, and thus is explained the reason why the nitrates are always found mixed with greater or lesser quantities of earth and sand. It is, therefore, evident that the nitrates have not a marine origin, but that the Salitreras are the natural consequence of the decomposition of the felspathic rocks; and as this class of rocks occupy the central parts of the desert, from the Rio Salado to the 24th parallel, there can be no doubt that besides those actually known, there exist many other Salitreras between the 25th and 26th parallels.

QUANTITY OF NITRATES.—The explorations made till the present in the Salitreras of Cachinal and Aguas Blancas are so insufficient as to make it rash to attempt to estimate, even approximately, the quantity of nitrate that they may contain. All that can be affirmed is that the quantity is large, and to give some idea of what it may be we will confine ourselves to the two allotments to discoverers—to those of the second and third Salitreras of the company of Guzman, which are those that have been most recognised. These allotments comprise 6,000,000 square metres. In several pits made in chance situations therein the thickness of the bed of nitrate ranges from 1 to 2½ metres; by taking only 1 metre as the average thickness we keep much below the mark, and this gives us 6,000,000 cubic metres, equal to 212,000,000 cubic feet (35,333,000 cubic feet by 6). A cubic foot of nitrate weighs about 106 lbs., equal to a trifle over 1,000,000 tons, and supposing a ley of 20 per cent., we have a result of 200,000 tons of purified nitrate of soda, or (say) sufficient to maintain for 40 years an annual product of 5000 tons of the refined nitrate.

MEANS OF EXPLORATION.—The nitrate deposits cannot well be compared with coal beds or other stratified minerals; they are so very irregular both in their thickness and quality that in order to reduce first expenses their exploration should commence in those parts where those of the highest ley are likely to be found, not a difficult matter when the small depth at which they are found and the soft nature of the crust that covers them are taken into consideration. The refinement of the crude nitrate is based on the much larger quantity of nitrate of soda soluble in hot than in cold water. At a temperature of 50° Fahr. water dissolves 0.78 of nitrate of soda, whilst at 212° it dissolves 1.77; this difference of (1.77 - 0.78 =) 0.99 is what separates and crystallises on cooling. Fuel is, therefore, a first requisite, and forms a principal expense; it may be found possible to substitute the sun's rays; nor would it be difficult during the day, and in an apparatus designed for the purpose, to raise water to a temperature of 140° Fahr., at which temperature

it dissolves 1.21 of nitrate, and on cooling would leave (1.21 - 0.78 =) 0.53 of refined nitrate. The most desirable quality of nitrate is not always that of the highest ley, the compact nitrate dissolves with difficulty, and requires the previous employment of a stone-crusher, whereas the nitrate mixed with a certain quantity of sand is much more soluble. In some Salitreras sufficient water for the treatment of the nitrates is not found, and they would have to be carried to where water is attainable, but such establishments ought not to be allowed near the fresh-water wells, as the residues would, by infiltration, mix with the water and render it unfit for domestic purposes.

MEANS OF TRANSPORT.—When treating of low priced products the cost of their transportation becomes a matter of vital importance, and cheap freight becomes a *sine qua non*. In this respect the Salitreras, especially the more northerly ones, are by no means favoured by Nature. Between the 26th and 24th parallels the Cordillera of the coast has an average height of near 4000 ft., and in all its extension only presents three passes through which it may be possible to establish a communication between the coast and the interior. The most northerly one, called the pass (Portezuelo, ó Quebrada) De los Remiendos, has been studied by a special committee. It presents no great difficulties for a cartroad, but a railroad would be no easy matter. The Quebrada, or valley, commences on the coast in lat. 24° 21'. For a short distance it takes a north-easterly direction, and then changes its direction to east, and east-south-east, till it reaches the first plains, at a distance of 17 to 18 miles from the coast; further on, and until it reaches the pass of Cardones, the ground presents no difficulties, but the rise through this pass is considerable, with a corresponding fall on the other or western side. To reach the vega of Aguas Blancas carts would have to perform a journey of 60 miles from the coast, and taking into account the difficulties of the road could not well carry over 50 quintals (500 lbs.) each. The pass of Paposo, in lat. 25°, presents still greater difficulties, and a good cart road there would be a difficult and costly affair. Finally, in lat. 25° 24' there is the port and valley (or opening) of Taltal. Here the coast chain is completely cut through, and the ground rises gradually from the sea to the foot of the Andes. The altitude of the watering-place of Cachiuyal, situated at the entrance of the plains (or table-land) is 4500 ft., at a distance from the sea of 38 miles, equal to a grade of 118 ft. per mile, or about 2½ per cent. This grade is generally uniform, except for a short distance below Las Breas, where there would be some difficulties, but these could be overcome at no great cost. This valley, therefore, does not present an unfavourable location for a railroad, and from the watering-place of Cachiuyal to the Salitreras of Cachinal the grade is still lighter. The difference of altitude between the second Salitrera of the company of Guzman and the wells of Cachiuyal is 1950 ft., and the distance between these two points is 25 miles, equal to a grade of 78 ft. per mile. From the Salitreras to the sea the fall is sufficiently steep and uniform to allow of the descent of the loaded wagons by the force of gravity alone. The port of Taltal appears destined to become the principal centre for the export of nitrates, and of all the products from the interior of the Desert, and these are not likely to be confined to nitrates alone, not to mention guano, borax, and other products.

From the 27th parallel to the limit of Chile, on the north, there are few parts of the Cordillera of the coast that do not contain some mineral veins. We need only remember the mines of Salado, Las Animas, Carizalillo, Cachiuyal, Paposo, &c. What chiefly characterises this region (the Cordillera of the coast) is the abundance of minerals of copper; these occupy principally the eastern slope of this chain of hills, and are found in those parts where the syenitic rocks are traversed by dykes of labradorites and augitic porphyries. They generally form veins placed between these dykes and the syenites, or in their prolongation, as if these lodes had been fissures, caused by the latest Plutonic rocks, and filled by the mineralised copper. In other parts it is seen to penetrate this rock, and form considerable masses, as happens at Carizalillo. There is also a notable difference in the formation of these minerals according as they are found in relation with the labradorites, or with the augitic porphyries. In the case of the labradorites, after passing the upper part of the lode that contains the oxides, chlorides, and silicates, we come to the copper pyrites, while in the case of the augitic porphyries we come down upon the sulphurets, the grey oxides, &c. (called here Bronce Morado); in this latter case this richer class of ores contain always a certain ley of silver, and in the former case the pyrites a certain ley of gold. The deposits of copper ores are not limited to the coast, but are also found at the base of the Andes; and as in this region the augitic porphyries predominate, the ores are richer, composed of grey copper, sulphurets, carbonates, and oxichlorides, but the great distance that separates them from the coast, as also the difficulty of procuring fuel, have prevented their exportation. It is also on this western slope of the Andes, where rocks of the Jurassic formation appear, that the silver mines are situated; a constant relation exists between the calcareous rocks and the augitic porphyries, the trachites, and silver lodes. These occupy a position similar to that occupied on the coast by the copper lodes, and fill up the interval between the calcareous rocks and the porphyritic and trachitic dykes.

If we bear in mind what has been said above regarding the distribution in the desert of the Jurassic formation, it is easy to form an idea of the situation occupied by the silver lodes. It has been seen that this formation, besides appearing on the western slope of the Andean chain, extends westward across the desert following the transverse ridges of hills that divide it, so as at times to approach near to the coast. The mineral districts known as Chimbero and Trespuntas are a first example of this distribution in a transverse chain. More to the north are the mines of Florida, situated on a band of calcareous formation that forms a part of the anticlinal ridge that shuts in to the north the hollow or depression of Salado. A dyke of augitic porphyry, with an east and west direction, has there upheaved the calcareous strata, and it is in the immediate vicinity of this dyke that the silver lodes are found. Nearer to the foot of the Andes is the mineral of Sandon, and finally, near to the 24° of latitude, on the edge of the boundary of Chile, are the mines of Palestina.

ANALYSES AND LEY OF NITRATES OF SODA.

Nitrates from Aguas Blancas.	
Insoluble—Clay and gypsum	Parts 9
Soluble	91 = 100
Nitrate of soda	16
Sulphate of soda	58
Chloride of sodium	24
Sulphate of alumina	8 = 103
Nitrates from Cachinal.	
Insoluble—Sand, clay, &c.	51
Soluble	49 = 100
Nitrate of soda	76
Sulphate of soda	24
Chloride of sodium	6
Sulphate of alumina	4 = 110
Nitrates from the Barón.	
Insoluble	47
Soluble	53 = 100
Nitrate of soda	59
Sulphate of soda	6
Chloride of sodium	34
Sulphate of alumina	5 = 97
Iodine—traces of.	

LEYS OF NITRATE OF SODA FROM VARIOUS SALITRERAS.

From Aguas Blancas	
Barón	15
Banados	27
Aquilar	42
Cachiuyal	15
Lavaderos	6
Pena de Aguas Blancas	37
	6

REPORT OF THE COMMITTEE OF GOVERNMENT TO THE HOUSE OF REPRESENTATIVES IN CHILE, JULY, 1877.

Your Committee having taken into consideration the various petitions for the privilege of constructing and working a railroad from the port of Taltal to a place called Cachinal de la Sierra. Judging from the reports of engineers and others, there is no doubt of the existence in the Desert of Atacama, in those parts, of nitrates guano, and other matters of commercial value, as also of many lodes of copper, consequently a railroad becomes not only expedient but necessary for the exploration of these natural riches, which exploration must without one be always imperfect. To avoid many incon-

veniences your Committee is of opinion that the best mode of procedure is that the House should authorise the executive authority to grant a privilege to such person or persons as may offer the most advantageous conditions; stating the general base of the contract and the maximum of the concessions that the Government can make. Your Committee, therefore, have the honour of proposing the following project of law:—

ART. 1.—The President of the Republic is hereby authorised—

- 1.—To grant a privilege for the construction and working of a steam railroad from the port of Talita to a place called Cachinal de la Sierra.
- 2.—To grant to the party offering the most advantageous terms the following concessions:—
 - A.—Exclusive privilege for a term of 30 years to the exploration of said railroad.
 - B.—Exemption from import duties on all materials for the construction and working of the line.

ART. 2.—Of the proposals that may be made the Government will esteem most advantageous—

- 1.—Such as offer the most efficient guarantee for the completion of the undertaking.
- 2.—Such as offer to construct it in the shortest time.
- 3.—Such as offer the most advantageous terms as regards freight and passengers.
- 4.—Such as trespass least on the public purse.

ART. 3.—A *sine qua non* to be the intervention of the Government in the tariff, so that in no case this remains in the exclusive domain of the contractors.

ART. 4.—The authorisation noted in Art. 1 to remain open during a term of two years.—Sala de la Commission, Santiago, July 12, 1877. Valparaiso, Chile. W. A. WALKER.

FOREIGN MINING AND METALLURGY.

Orders are being given out in the Belgian iron trade in a more and more regular fashion, always small quantities of iron it is true, but at any rate in a sustained manner. The Belgian Government has let some rather important contracts, which assure employment to the principal Belgian works. Other Government contracts are about to follow for first, second, and third-class carriages, vans, &c.—about 75 in all—required for the Belgian State Railways. The John Cockerill Company has delivered the lowest tender for the erection of a new station at Tournai; the terms required are 8760*l.* for the metallic portion of the work with payment in cash, or 8960*l.* with payment in old rails to the extent of one-half the contract price. The house of Eiffel, of Paris, has recently met with rather a serious misfortune in connection with a large iron viaduct which it is building at Culera, Spain. The length of this viaduct is upwards of 600 ft., and after about two-thirds of the ironwork had been erected it was carried away by a violent gale, and precipitated into the valley beneath. The Rhenish Railway Company has decided on closing its cross-rotting establishment at Nippes, as it proposes to have its permanent way composed exclusively of iron in future. The reduced tariff of 14*s.* 6*d.* per ton applied in September for the conveyance of rough steel and iron from Antwerp to Bâle on the Great Central Belgian Railway will be discontinued at the close of this month.

There has been a little more business passing in copper at Paris, and Chilean in bars made 70*l.* per ton; ditto, ordinary descriptions, 69*l.* per ton; ditto in ingots, 70*l.* per ton; English best selected, 73*l.* per ton; and pure Corocoro minerals, 70*l.* per ton. Transactions in copper have been extremely restricted upon the German copper markets. There has been rather more doing in tin upon the Paris market, and prices have remained without great variations. The German tin markets have also been quiet, and prices have exhibited a tendency downwards. The Paris lead market has been inactive; the German lead markets have presented little change. Zinc has been tending downwards at Paris rather than otherwise. The German zinc markets have ruled quiet.

In the French iron trade the past week has brought no very great change. There has not been much business doing, and the chief consideration of the moment has been the appointment of M. de Freynet and Teisserenc de Bort as Minister of Public Works and Minister of Agriculture and Commerce respectively. Upon the whole, it appears probable that the free trade cause will gain by the appointment of these ministers. Pig appears to be in pretty good demand in France. This is regarded as a rather good sign. Prices remain at about the same level. In the Nord iron has been selling at about the same prices as hitherto. Mention is made of a contract having been accepted by the St. Etienne Steelworks Company for the plates required for the construction of 25 locomotives and five locomotive tenders. The rates at which this contract has been accepted have not transpired. In the basin of the Loire ironmasters appear to be tolerably content with the state of affairs; girders, for instance, are in some request. The quantity of iron which entered Paris in the first nine months of this year was 44,500 tons, as compared with 16,500 tons in the corresponding period of 1876. The receipts in October, 1877, were 4500 tons, as compared with 2500 tons in October, 1876. The imports of pig and cast-iron into Paris in the first nine months of this year were 18,500 tons, as compared with 1150 tons in the corresponding period of 1876. The imports of October, 1877, were 2200 tons, as compared with 1800 tons in the corresponding period of 1876.

The weather has at last become cold and wintery in Belgium. Supplies of coal are accordingly being laid in now in earnest; and although the circumstances may appear of comparatively little importance, several consecutive days of frost have already exerted a direct influence on stocks. Metallurgical industry appears to be taking up a stronger position. It still hesitates to conclude contracts for long terms, but it is consuming rather more freely, although not sufficiently so to bring about an improvement in quotations, which remain at rather a low point. The termination of the French political crisis appears to have restored confidence to some extent among the French, and it is expected that Belgian coal will now be taken more readily upon the Paris market. Upon the whole, the tone of the Belgian coal trade appears to have improved. The Levant du Flenus Collieries Company will pay, Jan. 2, an interim dividend of 2*l.* per share for 1877.

The happy return of public tranquillity in France and colder weather have involved rather a more active demand for domestic qualities of coal; some advance in prices has, indeed, been established in some few cases, but this advance can scarcely be said to have been general. As regards industrial qualities of coal, there has not been much change upon the French markets. The situation appears to resemble greatly the situation of a week or ten days since; this remark applies at any rate to the Nord and the Pas-de-Calais. Now that the French political situation has cleared up a great impetus has been given to preparations in connection with the Paris Universal Exhibition. The Naval and Railway Blast-Furnaces, Forges, and Steelworks Company will pay, Dec. 31, a dividend for 1876-7 at the rate of 8*s.* per share.

PROFITS OF MINING.—The various mines listed on the San Francisco Stock Board have in the aggregate levied assessments amounting to \$55,578,103, and have paid dividends amounting to \$110,044,199. It will be noticed that the dividends are almost double the assessments, and yet some people say mining does not pay. Mining in stocks does not always pay by a good deal, but mining in mines is a different thing altogether. It must be remembered also that many of the mines listed on the board were never expected to pay, or intended for anything else than means of levying assessments or disposing of stock. Everybody who has ever had anything much to do with the stock market understands why this class of mines exist, and knows also that if they had not been taken into account the assessments would have shown a much smaller figure, although the dividends would not have been increased. Moreover, it must be recollected that there are only an extremely small proportion of the many mines on this coast, and of those not listed on the boards very little is known as far as yield is concerned. There are hundreds of mines in every direction which are paying well which make no showing in the above figures. For instance, we mention elsewhere in this issue the fact of the Idaho Mine of Grass Valley, paying its one hundredth dividend this month—\$2,270,820 in all—but it is a private corporation, and the stock is not dealt in on the boards. When one comes to think of it the figures given above show results which are not to be found in many kinds of business. A return of 100 per cent. on such large amounts is seldom found. The mines in question are mainly located in Nevada, very few California mines being enrolled on the boards. In fact, the

California mines on the boards are so few that of the total amounts they have only levied \$1,098,100 in assessments, and paid \$3,885,500 in dividends. These leads the list with \$100,000,700 dividends and \$1,098,100 assessments; White Pine assessed us \$1,550,961, and only returned \$31,999; Ely district levied assessments amounting to \$2,031,000, and paid a return of \$4,432,500; Tuscarora and Cornucopia levied \$388,000 in assessments, for which they have only so far returned \$262,500; miscellaneous Nevada mines have levied \$2,380,250 in assessments, and returned for this expenditure \$2,135,000 in dividends. Idaho mines treated their investors badly, having drawn out in the form of assessments \$3,426,000, and returned as dividends only \$675,000. In the last case, however, it was, no doubt, more the fault of the management than of the mine. It is well to call the attention of the public to facts like these occasionally, so that they will appreciate the value of the mining interests of the country in proportion to their value.—*Mining and Scientific Press*, San Francisco.

Meetings of Public Companies.

SOUTH CARADON MINING COMPANY.

At a general meeting of shareholders, held at the mine, on Wednesday (Mr. RICHARD KIRTON in the chair), the accounts for eighth, ninth, and tenth months showed a profit of 939*l.* 19*s.* A dividend of 1024*l.* (2*l.* per share) was declared, and the balance of 2694*l.* 12*s.* 10*d.* carried to credit of next account. The following report was read:—

Dec. 26.—I am pleased to say the mine still returns as large quantities of ore, and of as good quality as it has for many years past; and according to present appearances there is no reason to doubt the continuance of the mine, however, to add, owing to the very depressed state of the copper market, our profits are not so large as they would be, but should the market improve you may expect your dividends to increase.—JOHN HOLMAN.

ALMADA AND TIRITO CONSOLIDATED SILVER MINING COMPANY.

The fifteenth half-yearly general meeting of shareholders was held at the offices of the company, Finsbury-circus, on Friday, Dec. 21, Mr. WILLIAM MARTINEAU, M.I.C.E., in the chair.

Mr. H. G. DENNIS (the secretary) read the notice calling the meeting; the report of the directors was taken as read.

The CHAIRMAN said he regretted they had lost the services of their late Chairman (Mr. Needham), who had resigned his seat at the board, in consequence of having to go to Brazil. Mr. Needham had always bestowed great attention on every detail of the company, and he (the Chairman) would endeavour to follow that gentleman's example in that respect. They had before them the report of Mr. Breach regarding the operations at the mine for the first six months, and it would be presumptuous for him to say anything with regard to what had been done underground during that period. He was sure the shareholders would agree with him that the report showed an amount of work done and results obtained in a manner which reflected great credit upon Mr. Breach. He would say a few words on what had occurred since the date of Mr. Breach's report. First, he would refer to the fire in the mine. In July last the directors received a telegram stating that the probable loss entailed upon the company was \$1500. The first feeling of the directors was one of congratulation that it was no more; but they now saw that even if that \$1500 covered the actual expenditure upon repairs, the damage was not to be estimated in that way. The fire had thrown them back at least three months; but for the fire there was no doubt that three months ago the company would have been in the very materially improved position to that in which they found themselves to-day. The labour and personal danger incurred by Mr. Breach and the staff in the mine in repairing the damage done were very great, and they showed an amount of courage and resource which did them infinite credit. (Hear, hear.) Later on a resolution would be submitted thanking Mr. Breach for his great exertions they made in repressing the fire and repairing the damage done thereby. The fire was the work of an incendiary, who was brought to trial, but got off—not through any fault of Mr. Breach's. Other people appeared to have had fire worse than occurred in this company's mines, and in one mine 30 lives had been lost through suffocation. The reduction of black ores by the lixiviation process has gone on satisfactorily, and bars of base bullion produced by this process had been received here, amounting to \$1328, and further shipments worth 1000*l.* were now on their way. In affairs underground, particularly the discovery of the lode south of the south slide, he would read extracts from the last letters received from Mr. Breach within the last few days, which the directors had not yet had time to get printed and circulated:—

Capt. William Clemo, Oct. 13: Tirito: The branch working in the first lode, south of the engine-room below the Tunnel level, has nothing new since last week. Our prospecting cross cut through the south slide at the Tunnel level has no change to report. The winze sinking below the 42 fm. level improves as it gets down; the lode is widening; the quality of the ore is the same. The water is now in fork at the 54; the timbermen are now engaged in putting in a penthouse at this level for sinking the shaft.

Providencia: The lode in this place continues to look very promising, and turns out a fair quantity of good green ore.

Mina Grande: The west branch appears to improve as we go down with the stope. The pumping of the water in the Mina Grande shaft goes on satisfactorily.

Oct. 25: Tirito: The branch working in the first lode south of the engine-room below the Tunnel level, is very much improved both in quantity and quality since last reported on. Our prospecting cross-cut through the south slide at the Tunnel level has no change to report. The winze sinking below the 42 fm. level improves as it gets down; the lode is widening; the quality of the ore is the same. The water is now in fork at the 54; the timbermen are now engaged in putting in a penthouse at this level for sinking the shaft.

Providencia: The lode in this place has a decided improvement since last week. Mina Grande: The west branch continues to look well; the ore is now lengthening to the north. The pumping of the water in the Mina Grande shaft goes on favourably. I hope next week to be working in the 12 fm. level.

Nov. 1: Tirito: The branch working in the first lode, south of the engine-room below the Tunnel level, has no change since last week. The branch of the 12 fm. level, which was put in last week, has no change to report. The winze sinking below the 42 fm. level improves as it gets down; the lode is widening; the quality of the ore is the same. The water is now in fork at the 54; the timbermen are now engaged in putting in a penthouse at this level for sinking the shaft.

Providencia: The lode in this place continues to improve; it now turns out a fair quantity of good green ore. Mina Grande: The west branch is still improving; the branch is getting wider, and lengthening as it goes down. We have not yet begun to work in the 12, but I think we shall be able to commence by the end of the week. The water is now 3 ft. below the back of the 12 fm. level.

Nov. 8: Tirito: The branch working in the first lode, south of the engine-room below the Tunnel level, continues the same as last week. Our prospecting cross-cut through the south slide at the Tunnel level is now driven 57 ft. We have now passed the slide, and the lode, and have now some spots of good green ore speckled with pitauque; this place has now very promising appearance, more especially considering it is entirely in virgin ground, of which I have very great faith. The ore in the end from bottom of the winze below the 42 fm. level has given out in the bottom of the drive. We are now going to stop the two ends of the winze, and prospect this lode from the level below. We have now resumed the driving of the 54 fm. level north; nothing new to report.

Providencia: The working in this place has no change from last week. Mina Grande: The west branch is still looking well; no change to notice. We have not yet begun to work in the 12 fm. level, as the ground and still above are dripping a great deal of water yet, which is falling into the winze, and would cause us trouble to sink, but this water must drain off in a few days, then we shall commence to work in this winze. The water is now in fork in the Mina Grande shaft.

Frank W. Beach, Oct. 13: The new west branch in the Mina Grande is getting, if possible, more solid as it goes down, all ground broken from it is sent out, and I do not think the waste picked from it amounts to 3 per cent., so that it may be said to go from the mine to the furnace without sorting or cleaning of any kind. The other points working remain much the same. I see by Capt. Clemo's letter that the Providencia has improved since I saw it on Saturday last. The workings in this mine are rarely two days alike, consequently a large amount of ground is broken in proportion to the output; nevertheless, as the ore is invariably of a rich class, it pays the cost of working, and while that is the case we keep explorations going in the hope that it may lead to a discovery in some of the unexplored ground in this mine.

Oct. 26: You will be glad to note from Capt. Clemo's letter that there is a general improvement throughout the mine. In the Mina Grande the new west branch of ore continues very solid, and lengthens as we sink on it. In the Providencia the rough ground we are stopping produces more ore than it has yet expended. The works in the first vein in the tunnel when commenced barely paid expenses; now they turn out a fair amount of average ore, and in addition we sink this week out a branch of ore in the south east cross-cut from the tunnel, 2 ft. wide, and of very good quality. These two latter places are either on or near to the face of south slide. I will enclose a sketch of these next week which will give a better idea of the position of the ore. The ore in the winze in the 42 extends now the whole length of the winze, below the Tunnel level, and the ground is very solid, and the ore is very good. It has had the appearance of floors of ore, more or less in a horizontal position, but in the winze in question the ore is in vertical veins, more or less parallel to the foot-wall, and I accept the change as a favourable indication of the ore continuing in depth. The footwall runs north 4° east, and as a wall is all that could be desired, and almost downright, having a slight underlay to the west. The lode is very soft, and the winze goes down at the rate of 7 ft. to 8 ft. per week.

Nov. 1: Sketch of cross cut: I beg to enclose this, from which you will perceive the direction of the exploration through the south slide, and also the work done on the first vein. The two winzes are connected at a depth of 5 ft. and the ore between is being worked out. A level is going east on the face of the slide, also

arriving ore sufficient to pay expenses, and which I doubt not will be found to part with the ore out in the south slide last week. The ore in the cross cut the ground is very easy, and is changing constantly. The winze is in the cross slide or dislocation will not be found to be very thick. The sun has been in the cross below the 54, and work well, the water being conducted into the winze. We hope to keep the shaft dry for sinking, as the ground really contains no water, until the wall of the lode is cut. We shall start driving the 54 north next week, until Mina Grande and Providencia the improvement mentioned last week continues. I also hope to commence the winze from the 12 to the 24 in Mina Grande next week, as the water is now forked 2 ft. or a little more under the back of the 12.

Nov. 8: I yesterday forwarded telegram—"Love out under the back of the 12, ground improving towards the south." This contains all that it is prudent to say at present on the subject of the south slide. In the costaining works in order to indicate the continuance of the lode. On depending to the level of the tunnel and cross-cutting through the slide, as per sketch enclosed last week, we have now discovered the lode to the south of the 12 fm. level. Yesterday and last night, stones of rich dolomite were found, but, of course, at this early date no opinion can be formed as to the ore the lode may contain. In spite of adverse opinions I have never abandoned the hope of finding the lode south of the slide, and it gives me great pleasure to be able to report the discovery of its continuance, and to prove it we shall drive in the direction laid down on the sketch for some little distance further, and then cross-cut south west to what I have always supposed to be the west wall of the lode, and north-west to the south wall of the slide. By close to the slide we must expect to find the lode somewhat thrown out of its course. The water in the Balvanera shaft was forked last night, and we shall start the 24 winze as soon as possible, and also the winze in the 12 fm. level. I am sorry to say the 42 winze has passed through the ore at 30 ft. below the level. We shall not say what we can, to the 54. Now that the lode is found south of the slide on the level of the tunnel, it is a great pity we cannot drive to the 54 south.

When Mr. Breach in his telegram announced the discovery of the lode in the slide the directors did not suppose he had actually found valuable ore, because it was one thing to find a lode, and another thing to find ore in it; but it seemed from his letter that Mr. Breach had actually found good ore, and, therefore, he thought the shareholders would agree that the prospects of the mine were far better than could have been expected some time ago. The accounts for the half-year had been prepared in the usual form. He was sorry they did not show a profit; but when they remembered that the accounts presented six months ago showed a loss of \$5000, whilst the present accounts only showed a loss of \$800, it would be seen that they were moving in the right direction. They must bear in mind that, owing to the fire, there were three months not profitable working, during which time the expenditure was going on. There was one item in the accounts he would explain—the loss on the schooner Tirito. She was a small flat-bottomed craft, and as built at the time the company was shipping a quantity of ore. She was built at San Francisco, and answered extremely well, and if they had gone on shipping they would have been used for her. But the change in the character of the ore, and the introduction of the lixiviation process, threw the Tirito out of employment; she was "eating her head off," and she was sent to Mazatlan and sold. She was stated in the accounts as incurred in the transaction. There was a small amount of bad debts, which was incurred through the first master of the schooner Providencia, and there was no chance of recovering that. With regard to the issue of the remaining debentures, had the company been in the position it was a year ago the directors would not have asked such a thing of the shareholders. They wanted on account of the improved position of the company, mind which the directors were induced to recommend that some further money should be raised on debentures. They must always keep a good amount of money in reserve to meet any extraordinary contingencies which might arise, and to make the property safe, and it would not be proper to trench upon the reserve for new works. The money to be raised on debentures would not be spent simply because the directors had got it, but would be employed in remunerative works. He might mention that already almost all the present debenture-holders had agreed to forego the annual drawings until the directors found the company in a sufficiently improved position to warrant them paying them off. In conclusion, the CHAIRMAN moved the adoption of the report and accounts.

Mr. J. F. GEORGE SMITH seconded the resolution.

Mr. WILDE said the postponement of the drawing of the debentures was a good thing for the company. He suggested that it would be an advantage to the company if it could purchase the deferred shares at a low price.

Mr. SWAFFIELD differed with Mr. Wilde on the last point, and did not see that the purchase of the deferred shares would be an advantage to the company. He was gratified to hear that the company was in an improved position. The lixiviation process seemed to have been successful with the black ores. He understood the black ores were plentiful, therefore they might look for more profitable results in future. He hoped that in one or two half-years hence they might look forward to a still greater improvement in the state of the company's affairs.

The CHAIRMAN said with regard to the purchase of the deferred shares, that it was a question on which there might well be a difference of opinion. No doubt, if they could be bought for a small sum it would be an advantage to the company, and the directors had moved in that direction, and would do the same again the moment they saw their way to do so with advantage.

In answer to a further question, the CHAIRMAN said they had on deposit at the bankers \$2500, and 974*l.* upon current account. As regarded the ore on its way home, there was about 1000*l.* worth of base bullion and 400*l.* worth of pitauque metal. The company was not shipping ore now, as the remittance came home in the shape of base bullion, and occasionally shipments of pitauque metal, by which a considerable saving was effected in freight. He might mention that Mr. Breach was erecting one more new furnace.—The resolution for the adoption of the report and accounts was then put and carried.

On the motion of the CHAIRMAN, seconded by Mr. A. P. FLETCHER, Col. Wilbraham was elected a director in the room of Mr. Needham, resigned.

Col. WILBRAHAM acknowledged his election.

The CHAIRMAN moved a cordial vote of thanks to Mr. Breach and his staff for the energy and courage displayed by them in repressing the fire in the mine, and to Mr. J. H. Clemons for the skill showed by him in roasting the black ores, and their reduction into bars of base bullion by the process of lixiviation.

Mr. WILDE seconded the resolution, and said that when the shareholders received a dividend he hoped they would be able to afford more than a bare vote of thanks.

The resolution was carried.

A vote of thanks to the Chairman and directors closed the proceedings.

NEW ZEALAND KAPANGA COMPANY.

A meeting of shareholders was held at the offices of the company, Austinfrs., on Thursday.—Mr. H. WILSON in the chair.

Mr. LAYTON (the secretary) read the notice calling the meeting.

The CHAIRMAN having apologised for the absence, through illness, of Mr. Southgate (the Chairman of the company), went on to say that a meeting had been held so recently that there was very little information to be given on the present occasion, with the exception of reading some extracts from Capt. Thomas's letters recently received. He had to express his regret at the present meeting having been called at such a time, but they were compelled to hold it; therefore the chief business to-day was to receive and adopt the report and accounts, but if there was any point on which the shareholders desired information he should be pleased to give it.

The SECRETARY then read the statement of accounts.—A SHAREHOLDER asked whether there was any check on the expenditure out there?—The SECRETARY said that the directors have had the bank returns, and the bank vouchers for the money paid, and a little clip of gold was also sent over here every month so that the directors might have it assayed. The clip of gold was not always assayed every month, but whenever it had been assayed it was found to approximate as nearly as possible to the returns which were transmitted to this country.

The CHAIRMAN said there could not well be any difference between the gold raised in the mine and that which was sent home by the manager. The manager advised the directors of the amount of gold raised, and he afterwards had to give an account of the gold.

The SECRETARY, in answer to a further question, said there was a separate item in the accounts for the amount of gold sold.

The CHAIRMAN then formally moved the adoption of the report and accounts, which was seconded by Col. FLUDDY, and carried.

Mr. G. H. JAY was then elected a director in the room of Mr. Henley, who had resigned on account of ill health.

Mr. SOUTHGATE, the retiring director, was then re-elected.

The auditors were re-appointed, and five guineas voted them as remuneration for their services.

The SECRETARY then read extracts from the most recent letters which have been received from Capt. Thomas; these letters have already been published in the *Mining Journal*.

The CHAIRMAN said that was the only business before the meeting, but on an occasion like the present, no doubt they would expect a sort of retrospective history. That had been so frequently given that it was hardly necessary to take up their time in going into the matter again. Hitherto there had been a good deal of disappointment; he regretted to report the shareholders' account, and to do upon his own, because he had about 300 or 400 shares, which he bought at par, and the other directors were in the same position as himself. There was not the least reason for the shareholders to be disheartened about the property. Like all mining enterprises, it was not plain sailing. Hitherto the greater part of the capital had been spent by Capt. Thomas, in whom the directors had the greatest confidence and the greatest belief, not only in his energy and ability, but also the zeal with which he conducted the enterprise. The appeal to the shareholders a short time ago for the money had been fairly responded to, and the directors had remitted 1000*l.* to Capt. Thomas, and told him to push on with the works as fast as possible, and the directors expected in January to make another remittance of 1000*l.*, but before that date he hoped they would have some more cheerful reports from the mine. One thing was plain, that this was no bogus property. Every ton of lode stuff gave a very fair yield, in many cases more than 1 oz. per ton, and in some cases more than 2 ozs. per ton, but even supposing it did not rise beyond 1 oz. per ton the yield would be satisfactory. The great difficulty had not been in putting the mine on a number of men sufficient to turn out an output, and thereby enable him to remit gold to market. That had been the difficulty. For some time past Capt. Thomas had only been able to employ a few men, but the money which had been sent out would enable him to put on more men, in accordance with the instruction of the directors. The directors had not in the least degree lost heart in the property, and hoped to give the shareholders a good return upon their investment.

In reply to an observation, the SECRETARY said Capt. Thomas could not put on many men until he got the level driven through into the Albion stope. Captain Thomas hoped to raise 100 tons of quartz from that stope alone, and would be glad to put on men as quickly as he could.

Exchange, 66, Coleman street, London, E.C., Dec. 5, 1877.

"I wonder," says Uncle Henry "what is become of Old Tom," "you may take my word for'n," says Jan Jewell, "that Old Tom will smell the denner, and will soon be here." And no sooner said than done, and in walked Old Tom. "We thot," says Jan Temby, "that thees'd forgot the mitten, old fellow." "But I dedn't you see," says Old Tom, "and when I tell ee men the discorse I had coming up here with some young dandy miners, and all the time a took up you'll wonder how I got here so soon, so less have a bit of denner and I'll tell he all about'm." After Old Tom had finished, he said, "You see men as I was coming up between West Frances and W. Basset, I met young Cap'n. B— and Cap'n. C—, and some young gentlemen curren bags and hammers; so as Cap'n. B— knowed I, a said, 'Could you tell, Tom, where we could find some good gossan' and what do you think of the samples in our bags?' 'Well,' says I, 'sense you ax the question, I must be so bold to tell ee that what you cal gossan is no gossan.' 'What is it then?' says Cap'n. C—. 'Why, brown clay, says I.' 'You're an old fool,' says Cap'n. C—, 'and don't know good gossan from clay.' 'Don't I,' says I, 'but lev to tell ee Cap'n. C— that you'll never find mineral enuff under that clay you call gossan to make the point of a pin; and lev me to beg of ee, my dear young gentlemen, to throw away all that stuff, and don't carry un one inch farder; and eff you want to know what a real gossan is like, you've gone to school to the wrong maisters to know anything about gossan, for the caan't tell you what the don't know.'" "Ded you say all that, Old Tom?" said Uncle Henry. "I'es I ded, and a fine passle more, and when I come away the two Cap'ns wor like mazed men, and the young gentlemen wor loffen enuff to bust their sides. Now, that's the reason I'm so late, and I must tell ee men, as I ded tell the young gentlemen I jest mit, that lots of cap'ns and great writers and speakers going about the country making grand speeches in the institutions, don't know a right and true gossan from a tob of St. Ann's clay, for no man can know one bit about a thing a never seed, and where and where I should like to ax ded most of our young and middle-age cap'n's ever see a true gossan in a lode?" "I quite agree with ee, Old Tom," says Uncle Henry, "bekase the present generation of miners never worked in gossan backs, and all the know is about deep workings, and the in the same lode is no more like one another in character and appearance—that is, the lode in the 150 and the same lode in shallow gossan backs—than black is like white; and yet of a new lode es cut anywhere the are the very men who are cauld'n to decide ef es to be a bal or not. A man may seem very clever and tauk very fitty for hours about gossan in a glass case, but I say lev'n get experience first in the working of gossan backs before tauk about'n, and ef es a honest man, a will say there is no other way to know gossan." "I mind very well," says Jan Temby, "many years ago when I was working in Dol-coath, that there was a fine gossan lode in a shaft at Rose-knabrouse, a little to the west of Water-style; and I can tell, ee comrades, that the gossan in one end of this shaft (sinking from grass) was worth 300 ozs. of silver to the ton; and I can tell ee, too, that the gossan in the other end of this shaft was only worth 15 ozs. of silver to the ton; and, so far as any man could see or judge, the gossan was exactly alike in both ends of this shaft. Now, comrades

causing it to fall in a melted state in small regulated streams or drops upon a rapidly revolving cylinder kept cool by water circulating within it through hollow journals. The metallic lead so divided he spreads upon racks one above another, over and through which by an intermittent movement a solution of acetate of lead in water is caused to flow, white-lead being precipitated from such solution by the action of carbonic acid gas. He separates the white-lead from the solution by subsidence, or by passing it through a filter press, or by forcing it under and through a cloth supported by a grooved and perforated false bottom placed in a vat or vessel, and he washes the white-lead by keeping it agitated, and forcing water through it while under a similar false bottom placed in a separate vessel. He further produces white-lead by passing a current of carbonic acid into water with or without the addition of acetic acid or acetate of lead in solution, and containing finely divided oxide of lead, produced by the abrasion of metallic lead exposed alternately to the action of water or the lead solution, and to the atmosphere.

With this week's Journal a SUPPLEMENTAL SHEET is given, which contains—Original Correspondence; The Great Silver Discoveries in Arizona (H. Sewell); Tasmanian Tin Fields—No. III. (J. Mufford); Flagstaff Mining Company (M. C. Vincent); Condes Company of Chili; Galway's Coal Dust Theory; Safety Apparatus for Mine Lifts; The Buying and Selling of Mines; Electric Lighting of Mines—No. V. (A. Vassard); The Trials of Rock-Drills (Le Gros, Mayne, Leaver, and Co.); The Reported Discovery of Ore in Rhayader; "The Great Discovery of Lead near Rhayader," and other matters; Slate Quarries in Cardiganshire; Cardiganshire Mines—Cwm Erbin, &c. (A. Frances); Great West Van Mining Company (W. Ward); The White Cliff Lead Mining Company, Llanrwst (H. C. Parkes); Old Treburt Mine; Vale of Conway Lead Mines; the Cambrian Mining Company (G. H. Keene); "Circular Mining"; West Craven Moor Mine (Gregory, Whitaker, and Co.); Registration of New Companies—the Scotch Mining Share Market—Improved Rock-Drilling Machinery—the Globe Rock-Drill (Illustrated)—the Darlington Screw Rock-Boring Machine—Novel Pump Valve, &c.

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The Mining Market: Prices of Metals, Ores, &c.

METAL MARKET—LONDON, DEC. 28, 1877.

IRON.	£ s. d.	£ s. d.	TIN.	£ s. d.	£ s. d.
Pig, G.M.B., Clyde...	2 11 6	—	English, ingot, f.o.b...	71 0 0	71 10 0
" Scotch, all No. 1...	2 13 0	10 0	" bars...	72 0 0	—
" Welsh, f.o.b. Wales...	2 13 0	10 0	" refined...	73 0 0	—
" Stafford...	2 13 0	10 0	Australian...	65 0 0	—
" in Tyne or Tees...	2 13 0	10 0	Banco...	70 0 0	—
" Swedish, London...	2 13 0	10 0	Straits...	65 0 0	—
Rails, Welsh, at works...	5 0 0	5 2 6	COPPER.		
Sheets, Staff., in London...	5 15 0	9 0 0	Tongue and ingot...	70 10 0	71 10 0
Plates, ship., in London...	7 0 0	7 5 0	Best selected...	71 10 0	72 10 0
Hoops, Staff., in London...	7 0 0	7 5 0	Sheets and sheathing...	75 0 0	75 0 0
Nail rods, Staff., in Lon...	7 0 0	7 5 0	Flat Bottoms...	75 0 0	—
STEEL.			Wallaroo...	75 0 0	75 10 0
English, spring...	10 0 19	0 0	Burns, &c. Co.	74 0 0	74 10 0
" cast...	10 0 19	0 0	Other brands...	71 0 0	—
Swedish, keg...	10 0 19	0 0	Chili bars, g.o.b. nom.	65 10 0	65 0 0
" tag, ham...	10 0 19	0 0	PHOSPHOR BRONZE.		
LEAD.			Bearing metal...	2112 0 0	—
English, pig, common...	19 0 19	5 0	Other alloys...	2130 0 0	140 0 0
" L.B....	19 0 19	10 0	BRASS.		
" W.B....	20 0 0	—	Wire...	10 0 0	—
" sheet and bar...	20 0 0	—	Tube...	10 0 0	—
" red...	20 0 0	—	Sheets...	10 0 0	—
" white...	20 0 0	—	Yel. met. sheath. & sheets...	6 1/2	7 1/2
" patent shot...	20 0 0	—	Nails composition...	6 1/2	—
Spanish...	19 0 19	15 0	TIN PLATES.*		
NICKEL.			Charcoal, 1st quality...	1 0 0	1 10 0
Metal, per cwt...	23 0 0	24 0 0	" 2nd quality...	0 18 0	1 0 0
Ore, 10 cwt. per ton...	33 0 0	40 0 0	Coke, 1st quality...	0 18 0	—
QUICKSILVER.			" 2nd quality...	0 17 6	—
Flasks of 75 lbs. ware...	7 5 0	—	Black...	10 0 0	16 10 0
SPELTHER.			Canada, Staff. or Gla...	11 10 0	12 0 0
Shellan or Rhenish...	19 0 0	19 5 0	at Liverpool...	11 10 0	12 0 0
English, Swansea...	21 0 0	—	Black Taggers, 450 of...	30 0 0	—
Sheet zinc...	22 10 0	24 0 0	14 x 10...	30 0 0	—

* At the works, 1s. to 1s. 6d. per box less for ordinary; 10s. per ton less for Canada; 1X 6s. per box more than 10 quoted above, and add 5s. for each X. Terms—plates 2s. per box below tin-plates of similar brands.

REMARKS.—The Christmas festivities are so generally appreciated in dear Old England that not even the usually grave and sober-minded business man can remain wholly insensible to them, and there is, perhaps, more life and activity displayed during Christmas than at any other part of the year, but the excitement and eagerness to make purchases and investments unfortunally do not apply to metals, but is almost exclusively absorbed by the provision and fruit markets and fancy articles emporiums; however, we will not protest as we do not so much object to the temporary cessation of business, considering the pleasures and enjoyments are universal, and extend throughout Christendom. The price of copper and tin, important as it may be in a general way, does not appear to be considered in comparison with what will gratify and satisfy the palate and appetite, and the British public are so full of complimentary expressions, and so ready to bestow some substantial recognition of favour upon the deserving, the obliging, and the agreeable members of society, that little else is thought of. It is our festive season, when all is mirth and gaiety, and when happy and joyous scenes are prepared for the entertainment of all ages and all classes, and all are welcome who have the good sense and kind feeling to join in them. Hard and impenetrable as the man of metal may often be found, yet his character is softened under the genial influence of a cheerful family Christmas party, and the enlivening and elevating tendency of the convivialities render him perfectly indifferent to the downward tendency of markets. If copper and tin are not quite so buoyant just now as he would, perhaps, like them to be there is no doubt in his pure imagination that they will come right in the end, and let us hope that such pleasing anticipations may not be disappointed, but that realisations may exceed the most sanguine expectations. As we cannot say much in praise of the old year we refrain from speaking ill of the dying, and will merely remark that there is room for improvement in the ensuing one, and we most sincerely and heartily wish all connected with the metal trade uninterrupted and unparalleled prosperity during the year 1878.

QUICKSILVER.—The past having been a holiday week there has naturally been but a small business transacted, but there is a firm feeling, with indications of revival of demand; price 7l. 5s. The Californian market continues its upward tendency, and the price at San Francisco is now firm at 47½ to 48 cents. The receipts for the month of November were only 4825 flasks, against 6951 flasks in 1876—being, indeed, smaller than in any month since April, 1876. During the week ending Dec. 6, 1504 flasks were received, and 400 flasks shipped.

COPPER: Quiet, but steady.—TIN: Moderately steady.—IRON: Dull.—SPELTHER: Unaltered.—LEAD: Unchanged.—TIN PLATES: As before.

THE IRON TRADE.—(Griffith's Weekly Report.)—Friday evening, The Glasgow market for Scotch pig-iron has been quiet during the week. The price of G.M.B. warrants in Glasgow at the close of this afternoon's market was 51s. 6d., about 1s. 2d. per ton below the closing quotation last Friday. We quote makers' No. 1 iron—Gartsherrie, 6s.; Coltness, 6s.; Calder, 6s. 6d.; Langloan, 6s. 6d.; Summerlee, 6s.; Monkland, 6s. 6d.; f.o.b. Glasgow; Glenrath, 6s.; Eglinton, 6s.; f.o.b. Ardrossan; Rhotts, 6s.; f.o.b. Leith; Kennel, 6s.; f.o.b. Bo'ness. The Birmingham Quarter-day is fixed for the 10th prox., and will be held in the Exchange of that town. There is nothing special to notice on our market this week in iron. The Bank holiday on Wednesday (being Boxing-day) closed all business, and as all parties are engaged in Christmas festivities, we have no business to report of the least importance on our Exchange this week. The same cause has kept the works idle in iron making centres, and on this account we have but little to say in regard to the trade in manufacturing districts. The great Shropshire and Swan Garden Works of G. B. Thornycroft and Co. were closed last Saturday, never again

to be started by this eminent old firm. It is reported that the works are sold; however, up to the present moment nothing is definitely settled or signed in regard to this important transaction. Possibly the contract for sale may be signed to-morrow (Saturday).

Business, with the exception of settling the fortnightly account, has been almost at a standstill this week, and in the MINING SHARE MARKET there is nothing particular to report upon either in the way of changes or improvements, or in our quotations, which for the most part are merely nominal, and will probably remain so till the commencement of the new year, when we trust that a more active business will commence, and a prosperous time set in for "one and all."

TIN MINES continue flat, with scarcely any business doing, either for speculation or investment. Wheal Bassett, 10 to 12; at the meeting the accounts showed a loss of 696l. on the quarter, and a debit balance of 7370l. A call of 2l. per share was made. The tin sold, 59 tons, realised 2450l.; copper, 484l. Costs charged to November. The agent's report states that in another two months he hopes to reach the great vein of tin ground gone down below the 115 fm. level, where he has always anticipated the most favourable results. It was announced that the claims on audit account have been settled, South Frances and West Bassett each agreeing to pay Wheal Bassett 100l. The settlement was approved of.

Carn Brea, 42½ to 45; Cook's Kitchen, 2 to 2½; Dolcoath, 33 to 35; Penstruthal, 4s. to 6s.; South Condurrow, 9 to 9½. South Frances, 2½ to 3½; the prospects here are said to be improving. Tincroft, 12 to 13; West Godolphin, 1½ to 2; Wheal Agrar, 4 to 4½. Wheal Grenville, 3 to 3½; call of 1s. paid. Wheal Kitty, St. Agnes, 2½ to 2¾; Wheal Pevor, 6½ to 6¾; Wheal Uney, 1½ to 1¾; South Crofty, 10 to 15; Livingstone Consols, 15s. to 20s.

COPPER MINES.—One or two dividends have been declared during the week, but there is very little doing in shares. South Caradon, 85 to 90 ex div.; at the meeting a dividend of 2l. per share was declared. The accounts showed a profit of 300l., and 656l. recovered from a dishonoured acceptance of the Copper Miners' Company. The agents report that the mine looks as well as it has done for years past. West Tolgus, 75 to 77½; at the meeting here a dividend of 1l. 10s. per share was declared. The accounts showed a profit of 1129l., and a balance carried forward of 1442l. The copper ore sold and credited realised 14677l. The returns made for the next account are 3548l. The mine is reported as looking well, and in the winze sinking under the 135 the lode is worth 12 tons of copper ore per fathom. The new discovery west of cross-course is worth 6 tons. Devon Great Consols, 3 to 3½. Wheal Crebor, ½ to 1; the lode in the 120 east has improved to 20l. per fathom. West Seton, 14 to 15; Parys Mountain, 9s. to 10s.; Morfa Du, 7s. 6d. to 10s.; Prince of Wales, 3s. to 4s.; Kingston Down, 3s. to 6s.

LEAD MINES have been dealt in to a moderate extent, and prices remain about the same. Roman Gravels, 7½ to 7¾; the sale of lead ore, 180 tons, with 20 tons of blende, realised 2238l. Tankerville has been rather more enquired for at a slight advance, and leave off 4 to 4½. Cargoll, 2½ to 3; at the meeting there was a balance against the company of 558l., and a call of 5s. per share made. The lead sold realised 180l., and the loss on the quarter was nearly 1000l. Glenroy, 16s. to 20s.; a telegram states that the lode in the shaft is 9 ft. wide, with more blende in it. In the 25 and there is 1 ft. of rich blende. Van, 29 to 31; East Van, 3½ to 4; Great Laxey, 2½ to 2¾. North Laxey, 6s. to 8s.; a meeting has been called for Jan. 10, to take the local management into consideration. The stope in the back of the 60 is worth 1 ton of lead per fathom. D'Eresby Mountain, 50 to 60; Leadhills, 4½ to 4¾; Llanrwst, 1½ to 2; Herodfoot shares have further advanced to 10, 12½.

Pateley Bridge, 3½ to 3¾; West Pateley, 2½ to 2¾; Rookhope (Lead), 19s. to 21s.; West Tankerville, 12s. 6d. to 17s. 6d.; West Chiverton, 13½ to 14½; Temple, 2½ to 2¾; Wye Valley, 2½ to 2¾; West Wye Valley, 3½ to 4; Grogwinion, 4 to 4½; St. Harmon, 1½ to 2. Van, 30 to 32; we understand the dividend next week will be 12s. per share, and about 1000l. added to the reserve fund. North Cornwall, ½ to ¾ prem.; Gorsead and Merilyn, 5 to 5½; Pennant, 4½ to 5½; Great Holway, 5 to 5½.

In FOREIGN MINES Chontales are quoted at 10s. to 12s. 6d. Don Pedro North del Rey, 5s. to 7s. 6d. Eberhardt, 8 to 8½. Flagstaff, 17s. 6d. to 22s. 6d. Frontino and Bolivia, 2½ to 2¾. New Zealand Kapanga, 1 to 1½. New Quebrada, 2 to 2½. Port Phillip, ¾ to 1. Richmond, 8½ to 8¾. Argentina, 2½ to 3. Blue Tent, 3 to 3½. Condes, 2 to 2½. Hultafall, 5 to 5½.

The Market for Mine Shares on the Stock Exchange has been almost entirely without business, as most of the dealers had commenced their holidays on Monday, whilst Tuesday and Wednesday were closed days, and Thursday and Friday were devoted to exchanging healths and good wishes, accompanied by the hope that the coming year will be a more prosperous one both for capitalists and dealers. During the year just closing the frauds habitually practised by promoters and others connected with the floating of companies and sale of property to them have been so thoroughly exposed that it is unlikely that even those who are still at large (for several are already receiving gratuitous board and lodging) will attempt a repetition of their malpractices. All the recent legal decisions seem to show that the Courts are determined to encourage legitimate enterprise by protecting those who provide the funds for carrying it on, and that the law, as at present stands, is strong enough to enable judges and juries to do so in now beyond question. It would be for the good of all if every capitalist who now holds shares in a public company which has failed to turn out as remunerative as promised would aid in securing an investigation into the process by which the company was floated, the proceedings of the promoters, and the amounts which have been appropriated by those who have been concerned in the transfer of the property from the original vendor to the company. There are many solicitors of acknowledged position who would undertake the professional conduct of the investigation for a percentage of the amount recovered from the intermediate vendors and promoters, and the amount that could be so recovered would in many cases furnish such a working capital fund as would permit of the properties being raised from their present state of bankrupt inactivity to a position of permanent prosperity. The suggestion would be equally applicable to companies working home and foreign mines, and as several of those most readily dealt in at the present time are those in connection with which investigation is most needed there would be the less trouble in carrying it out.

In his general summary for the year our Cornish Correspondent gives some interesting figures with regard to the dividends paid by the Cornish and Devon mines as compared with those of 1876. It appears that in 1876 there are 13 mines paying dividends, and the amount distributed was 40,871l. During the year just closing there were 15 mines in the Dividend List, and the nominal amount distributed as dividends has been 68,004l., but he remarks that there is uncertainty as to whether in the cases of Holmbush and Wheal Newton the amounts have been paid. The fact appears to be that in these mines the dividends were declared at so much per share at a time when comparatively few shares had been issued, and that such dividends were paid upon those shares only which were issued at the date of declaration. If this really be the principle upon which the dividends have been announced it is, to say the least, very misleading to subsequent investors, and if it be not the executive should lose no time in putting themselves right with the public, the very common enquiry being as to what ores have been produced and what market they have been sold in, as no figures can be found in any of the public records to account for any such profits as those mentioned. Those connected with the management of the companies will, naturally, we believe, be as glad as any one of our readers to have an opportunity of removing by the publication of the fullest details, the probably erroneous impression which exists. It is not always well, however, to suggest deductions in respect of all dividends which are declared upon incomprehensible grounds, or out of profits which the outsiders cannot understand to have been made, or Wheal Prussia and Pedn-an-drea, and perhaps, one or two others, might have to be ranked with the two already referred to. It is to be hoped, however, that in all these cases the matters are capable of explanation, and that no time will be lost

by those concerned in removing all possible misapprehensions. But even expunging the whole 26,125l. standing against these four mines, the distributed dividend fund for 1877 still stands at 41,870l. There is a decidedly better prospect of the coming year proving a more prosperous one both for capitalists and working miners.

St. John del Rey, 300 to 310 ex div.; the telegram received on Thursday, dated Rio de Janeiro, Dec. 24, states that the profit for November was 8700l. This was obtained from a produce of 42,500 oits. of gold, extracted from ore averaging 7½ oits. per ton, at an aggregate cost of 7769l. Don Pedro North del Rey, ½ to ¾; the produce cleaned up for the first division of December was 1650 oits. The 60-ft. iron wheel for driving the permanent pumping machinery has been set to work for a trial and to adjust balance, and so on.

Richmond 8½ to 8¾; the usual weekly telegram from the mines states that the week's run was 880,000, from 1070 tons of ore, with three furnaces. The week's produce of the refinery was 47,000. The agent's report is to Dec. 5. The 400 stope is not looking so well, but the 500 cross-cut is improved in appearance; for the last 20 ft. it has been in ore matter on a well-defined fissure, and he is expecting they will strike ore in this drift shortly. In the 600 they expect to cut the quartzite again shortly. There is also no change in the 800 drift on quartzite. The winze on fissure in the 900 has been sunk 15 ft. in very favourable ground, the fissure being still well defined and regular. The furnaces and refinery are going on satisfactorily.

At Minera Hill the parallel extension of the Queen Tunnel is 56 ft. from the old end, and during the week the ground is changing, getting more easy to drive, and more favourable for the existence of ore. In the Cave the quartz ledge still holds out; it is apparently widening, and they are rising on it.

The market for Hydraulic or Gold Washing shares continues quiet. There are few shares offering. Rains are reported as pretty steady, though it does not appear that any of the companies represented on the market have been advised that washing has been commenced in earnest. Blue Tent, 3 to 3½; the latest advices from the superintendent are dated Dec. 1, and state that everything was in readiness for washing as soon as the expected rains commenced.

Hultafall, 4½ to 5; good progress is reported in sinking the engine-shaft, and it is said that notwithstanding the dip in the lode there are still 3 ft. of solid ore in the shaft, the lode standing of course at the side. The levels east and west are in rich ore. The erection of the dressing machinery is being pushed forward energetically, and it is expected it will be nearly completed by the end of January. A large box of samples, a fair average of the lode in the deepest workings at the Hultafall Mines, was yesterday (Friday) received at the company's offices, Austinfrans, and from the quality of the ore, it being a solid mass of lead and blende, it is of interest to all connected with mining operations, and to whom Mr. Lavington will be glad to show the specimens.

Lead Mines have been without special feature, and new business has been checked by the fortnightly settlement and the adjustment of accounts at the end of the year. Van, 29 to 31; the various engines are looking much the same as last reported, and all operations are proceeding in the usual manner. Grogwinion, 4 to 5; the usual monthly sampling of 100 tons of lead took place on Dec. 21, for sale to-day. The mine continues to look well at all points. West Wye Valley, 3½ to 4; 50 tons of lead have been sampled for sale to-day. Mine looking well. Wye Valley, 2½ to 2¾; no news this week. Red Rock, 2 to 2½; all going on well. Caron, 2 to 2½; prospects at the mine are reported to have steadily improved. South Cwmystwith, 3½ to 4; it is expected that sales will commence in a few days, Llanidloes, 2 to 3; the bottom level is looking promising. Pateley Bridge, 3½ to 4½; there is no change reported from the mine this week. The hard frost is slightly interfering with surface operations. West Pateley, 2½ to 2¾; it is reported that the feeder announced last week to have improved the lode in the 30 fm. level east is now opening out well west; it has increased from 12 to 18 in. in width, and contains fine branches of lead ore. Other points maintain former reported value. Snowstorms have somewhat interfered with surface work.

Subjoined are the closing quotations:—
Ashton, ¼ to 1; Devon Great Consols, 3 to 3½; East Caradon, ½ to ¾; Est Lovell, ¼ to 1; East Van, 3½ to 4; Glenroy, ¼ to 1; Grand Laxey, 2½ to 2¾; Hington Down, ¼ to ¾; Leadhills, 4½ to 4¾; Marke Valley, ¼ to ¾; Parys Mountain, ¼ to ¾; Pateley Bridge, 3½ to 4; Penstruthal, ¼ to ¾; Roman Gravels, 7½ to 8; Rookhope, ¼ to 1½; Tankerville, 4 to 4½; Tincroft, 12 to 14; Van, 29 to 31; West Ashton, ¼ to ¾; West Chiverton, 12 to 14; West Pateley, 2½ to 2¾; West Tankerville, ¼ to ¾; Wheal Grenville, 3 to 3½; Almaden, ¼ to ¾; ¼ to ¾; Argentina, 2½ to 3; Birdseye, ¼ to ¾; Blue Tent, 3 to 3½; Cape Copper, 3½ to 3¾ ex div.; Cedar Creek, ¼ to ¾; Chontales, ¼ to ¾; Colorado Terrible, 1½ to 1¾; Condes of Chili, 2 to 2½; Don Pedro, ¼ to ¾; Eberhardt and Aurora, 8½ to 8¾; Exchequer, 4s. to 6s.; Flagstaff, ¼ to 1½; Frontino and Bolivia, 2½ to 2¾; Hultafall, 4½ to 5; I.X.L., 3-16ths to 5-16ths; Javali, ¼ to ¾; Kapanga, 1 to 1½; Last Chance, 2 to 2½; New Quebrada, 2 to 2½; Oregon pref., 4½ to 4¾; Pestana, 3-16ths to 5-16ths; Plumas Eureka, 1½ to 1¾; Port Phillip, ¾ to 1; Richmond Consolidated, 8½ to 8¾; St. John del Rey, 300 to 330; San Pedro, 1 to 1½; Sierra Butte, 1½ to 1¾; South Aurora, 3-16ths to 5-16ths; Tecoma, ¼ to ¾; United Mexican 2 to 2½.

COLLIERIES.—During the past fortnight the advent of the Christmas holidays has had the effect of stopping business, and, as in all the markets of the Stock Exchange, few transactions have taken place. In the coal and iron trades, however, there are not wanting signs of a revival, and better prices are in some parts of the country being obtained. In the Liverpool district trade remains fairly good, and the Chapel House Colliery is turning out regularly its average rate of profit. The new pits at this colliery will, it is believed, be completed by the end of January, after which the output will be increased. The shares close this week at 3 to 3½. Alltani have been done at 4 to 5. The engine at section C is nearly complete with guide-ropes and cage, and in a few days will be in full work drawing coal. At section D progress is considered satisfactory. Mold Argood, 2 to 3; Lay Hall, 8 to 10; a good output is being turned out from this colliery, and sales are satisfactory. Andrew Knowles and Son, 19½ to 19¾. The debentures have not been taken up well by the West Mostyn shareholders, and it is anticipated some scheme will have to be laid before them. The colliery is a good one, and should be well supported. If this be done with spirit, and the remaining debentures subscribed for quickly, there is little doubt the colliery would prove entirely successful. New Sharistons have changed hands at 3½ to 4; Thorpe Gowers, 2½ to 2¾; Bolckow, Vaughan at 53 to 55. In the Staffordshire district improvement is not so noticeable as in other quarters, though with anything like a settled state of the political world the prospects of the coal and iron trades may be said to be fairly good. Cakemores have been little dealt in, and prices remain nominally at 2 to 2½. Pellets close the week at 2½ to 3½. In South Wales a notice of a reduction in wages has been given to the men, and at most collieries this rate is the difference between a profit and a loss. Cardiff and Swansea collieries have been turning out a regular output nearly equal to the average, but like other collieries in the neighbourhood has given notice to its men. The shares close at ¼ to 1½. Newport Abercrombie close at 4 to 4½. The anthracite trade is improving, and a great impetus is being given to it by the introduction of a new invention which enables the anthracite coal to be used to advantage without burning at the furnaces, while yielding an evaporating power of about 40 per cent. above ordinary steam coal. Anthracite is now better used for steam purposes at all of the stations on the Metropolitan Railway, and gives great satisfaction. It is also being tried by the Government at Woolwich, and should it prove successful here the future of the anthracite trade will be assured, and those interested in this branch of the coal trade will find it immensely profitable.

CAST HOLLOW COPPER CYLINDERS.—In the production of castings in copper, and especially in the production of cast hollow copper cylinders and other cored articles, great difficulty is experienced in obtaining a thoroughly sound casting, the metal being generally porous or unsound at or near the surface, and especially so in the case of surfaces formed in contact with the core. The object of the invention of Mr. E. EVERITT, of Birmingham, is to remedy this defect, and consists of the improvements hereinafter described, whereby sound castings in copper can be produced with great certainty. The invention is especially applicable to the production of cast hollow cylinders of copper for the manufacture of seamless copper tubes. In the production of cast hollow cylinders of copper or other castings in copper, according to his invention, he proceeds in the ordinary way in the preparation of the mould and in the melting of the copper, but shortly before removing the melted copper from the furnace, or after having removed it therefrom, he introduces into the melted metal a quantity of cyanide of potassium. The proportion of the cyanide of potassium to the melted copper does not require to be adjusted with nicety, but he has found in practice that 24 ozs. of cyanide of potassium to 100 lbs. of copper gives excellent results. The cyanide of potassium is stirred a short time with the melted copper, when the latter is ready to be poured into the mould. The casting produced is free from the spongy or unsoundness common to copper castings. Although he prefers cyanide of potassium, yet other analogous cyanide, such, for example,

as the cyanide of sodium, may be employed; or compounds which in contact with melted copper yield a fusible cyanide may be employed, such, for example, as dried ferro-prussiate of potassium.

PRODUCING IRON AND STEEL FROM OXIDE OF IRON AND ORES.

The process of ore dressing or separation by mechanical means of the worthless impurities from the valuable ore before it is subjected to chemical treatment in the furnace is very advantageous, for the reason that the cost and loss of material in dressing is less than the cost or loss of waste of material in smelting. Iron ores are usually treated in the furnace without any previous attempt to remove the associated impurities by mechanical means, and in this operation chemical complications ensue, the solution of which has occupied and continues to occupy the attention of many eminent men, whose scientific investigations relating to this subject fill many volumes. To remove the silica from the ore, large quantities of limestone and coal are consumed in furnaces of large dimensions with the result of producing proportionate quantities of worthless slag, while the iron produced remains contaminated by impurities which require subsequent further chemical manipulation for their removal.

According to the invention of Mr. B. W. HART, of Garway-road, he proposes to separate by mechanical means impurities associated with oxide of iron or other iron ores. He crushes the ore to the required fineness; he separates the associated minerals by the process analogous to that usually known as jigging, but in machines wherein air is the medium employed for the separation which takes place according to the respective specific gravities of the minerals associated, the oxide of iron or other ore of iron being by this means obtained in a nearly pure condition. The iron ore so purified is then exposed to the action of heat in a blast-furnace, or in a reverberatory or rotating furnace, or any other suitable furnace, and metallic iron or steel is thereby obtained. By this invention he effects the separation of the ore of iron from the associated mineral impurities, in whole or in part, by mechanical means, before the ore is heated in the furnace—that is to say, by jigging with air as the separating medium.

NEW ROTARY ENGINE.

An apparatus which the inventor describes as an improved steam-wheel, adapted to take the place of the ordinary steam-engine, and which is at once simple in construction, reliable in operation, and safe in use, has been suggested by Mr. J. C. THOMAS, of Carlisle, U.S. The novelty of the arrangement consists in the combination of moveable pistons, rods, spring boxes, slotted guides, levers, and slides, provided with outwardly projecting pins, with a flanged wheel and geared case; in the combination of the steam-chest, the segmental packing provided with the projections, the inlet and the outlet port, and the adjustable block with each other, and with the flanged wheel and the case; and in the combination of the crank rock shaft, the extensible connecting-rod, and the grooved wheel with the valve of the steam-chest, and with the shaft that carries the wheel for controlling the movements of said valve from the movements of the wheel. The lower part of the case of the wheel is made rectangular in form, and in bearings in the upper parts of the sides revolve the journals of a shaft, to which shaft is attached a wheel, the face of which has ring flanges formed along its edges, making a wide deep groove or channel upon it. The wheel is made with six or more arms connecting its rim with its hub, and in its face between its flanges, and midway between its arms, are formed deep transverse grooves, in which radial pallets work. To the inner edge of each of the pallets are attached the outer ends of two or more rods, which pass through stuffing boxes attached to the inner side of the rim of the wheel to prevent any steam from passing into the interior of the wheel around the rods.

The inner ends of the rods are attached to the outer sides of boxes, in the open inner sides of which bars are held out by springs placed in the said boxes. The ends of the bars pass through slots in the ends of the boxes, which gives the pallets a little play, while the springs hold them all the time against the packing hereinafter described. The ends of the bars enter guide slots in radial bars, which have their outer ends attached to the rim and their inner ends attached through holes in the ends of the long arms of levers which are pivoted to the side edges of the arms which connect the rim with the hub of the wheel. To the ends of the short arms of these levers are pivoted the inner ends of bars which slide in keepers attached to the rim of the wheel, and have outwardly projecting pins formed upon or attached to their outer ends. The pins have friction sleeves or rollers placed upon them to diminish the friction as the said pins move through their guide slots. The pins move through guide slots made in the sides of the case, and which are made with jogs or offsets to protect the pallets, to receive steam, and to draw in said pallets at the exhaust ports.

The steam-chest rests upon the upper edge of the case of the wheel the steam being admitted through a hole in its side, passing to the wheel through an inlet port, and is formed upon or secured to the upper end of packing, which is curved upon the arc of the circumference of the wheel, and has projections upon its upper and lower ends of such a size as to fit into the space between the flanges of the wheel. The inner sides of the projections are inclined or bevelled, and their faces are recessed to receive the brasses, which are held out by springs against the face of the wheel. The ends of the brasses have arms formed upon them projecting back at right angles across the ends of the projections, so as to rest against the inner sides of the flanges of the wheel, against which they are held by springs.

The body of the brasses is made in two parts halved to each other, so that it may be expanded and contracted longitudinally to enable its end arms to adjust themselves to the inner sides of the flanges of the wheel. Upon the inner side of the brasses a plate is placed against which the springs which hold the brasses out rest, to prevent steam from passing through the space between the parts of said brasses when said brasses are extended longitudinally. The packing rests upon and is supported by a block, the forward side of which is concave to receive and fit upon the outer side of the packing. The outer part of this block is made angular to fit into the end of the case, and the block is moved forward and back to adjust it by a screw passing in through the middle part of the end of the case, and is then turned to cause the packing to bear squarely against the face of the wheel by four set screws passing in through the corner parts of the end of the case. The block is held down upon its seat by flanges formed upon the inner and outer ends of its base. One flange enters a keeper attached to the bottom of the case, and the other flange passes out through a hole in the end of the said case. The latter flange is slotted to receive a screw, by which the block is further secured in place. The exhaust port passes through the lower part of the packing, through the lower part of the block, and through the bottom of the case.

The entrance of the steam through the inlet port is regulated by a valve placed in the steam-chest. The valve stem passes out through the wall of the steam-chest, and its outer end is pivoted to the end of an arm rigidly attached to a shaft, which rocks in bearings attached to the end of the case. One end of the shaft projects beyond the side of the case, and to it is attached a crank arm to receive a notch formed upon the lower side of a connecting-rod which slides in guides attached to a bracket attached to the case. To the inner side of the outer part of the rod is attached a pin, which enters a groove in the side of a wheel that is mounted on the shaft that carries the flanged wheel. The said groove is made in the general form of a circle, with as many salient curves as there are pallets to the flange wheel, and in such positions as to operate the valve to admit the steam as each pallet passes the inlet port. The length of the curves regulates the length of time the valve is held open.

The connecting-rod is made in two parts, connected to each other by a long or swivel nut, so that the said rod may be lengthened or shortened to regulate the throw of the inlet valve. To this rod, directly over the notch that receives the pin of the crank, is pivoted a hook to be hooked upon a pin or neck formed upon the end of the crank shaft. The hook is made of such a length that when hooked

upon the shaft the notch of the rod may be raised from the pin of the crank to enable the valve to be operated to start the wheel whatever be its position. A hole is formed in the crank shaft to receive a hand lever for operating the inlet valve by hand in starting the wheel. The upper part of the wheel is covered with a cap or case to keep out dust and dirt.

METALLIC PISTON.—According to the invention of Mr. J. GOODFELLOW, of High Cheshire, he dispenses with the outer rings, and employs two helically cut rings one within the other. The outer surface of the outer ring works in contact with the cylinder in which the piston is fitted to work. One ring is cut with a right-hand spiral cut, and the other ring with a left-hand cut. The spiral cut in each ring does not extend entirely around the said ring. He has obtained good results from a ring cut with a spiral cut extending around about two-thirds of the circumference of the ring, the remaining third or thereabouts being uncut, but he does not confine himself to these proportions. In some cases he makes the rings tapering in cross section; that is to say, he bores the outer ring conically, and turns the inner ring conically to correspond. Although he prefers that the said spiral cut in each ring shall not extend entirely around the ring, he does not intend to confine himself to this particular system of cutting; and if preferred or considered to be more suitable in any case or for any reason, a spiral cut extending more than once around the ring, or even making two turns or more than two turns around the ring, may be employed. Although he has referred to the application of the said piston to steam-engines more particularly, he does not confine himself to such application, as pistons constructed in the manner indicated may be used as air pump buckets, and are also applicable for other purpose wherein metallic pistons are required.

LEAD ORES.					
Date.	Mines.	Tons.	Price per ton.	Purchasers.	
Dec. 14	Tan-y-Bwlch	50	£12 1 6	Adam Eytton.	
15	Llanfrynach	30	11 3 0	Nevill, Druce, and Co.	
17	Roman Gravel	50	12 8 0	ditto	
—	ditto	50	12 5 0	ditto	
—	ditto	50	12 3 0	George Barr.	
—	ditto	30	12 3 0	ditto	

HORNACHOS (Silver-Lead).—This company sold on Dec. 22, to Messrs. Nevill, Druce, and Co., 19 tons 13 cwt. = 588. 18s. 6d.

BLENDE.					
Date.	Mines.	Tons.	Price per ton.	Purchasers.	
Dec. 27	Roman Gravel	20	£3 15 6	Dillwyn and Co.	

BLACK TIN.					
Date.	Mines.	Tons c. q. lb.	Price per ton.	Amount.	Purchasers.
Dec. 27	Wheal Coates	2 4 0 23	£40 12 6	£89 15 10	Daubuz.

COPPER ORES.

Sampled Dec. 5, and sold at the Royal Hotel, Truro, Dec. 20.					
Mines.	Tons.	Price.	Mines.	Tons.	Price.
Devon Great Consols.	106	£1 10 0	Marke Valley	35	£2 18 6
ditto	14	1 13 0	ditto	30	1 13 0
ditto	88	1 10 0	ditto	29	4 7 6
ditto	83	1 16 6	Glasgow Caradon	77	4 3 6
ditto	82	2 0 0	ditto	74	3 7 6
ditto	79	1 16 0	ditto	54	3 1 6
ditto	75	1 9 6	Hington Down	70	1 1 0
ditto	69	4 15 6	ditto	53	2 6 6
ditto	65	1 12 0	ditto	34	2 3 6
ditto	64	4 12 0	ditto	31	1 15 0
ditto	55	4 78 0	Wheal Crebor	94	2 11 6
ditto	42	5 6 0	ditto	70	2 11 6
ditto	30	4 19 0	Gawton	75	2 11 6
ditto	22	1 9 6	ditto	58	1 6 6
South Caradon	81	3 6 0	West Maria & Fortescue	62	1 12 0
ditto	78	3 1 0	ditto	62	3 1 0
ditto	69	5 6 0	Bedford United	62	3 8 6
ditto	71	7 10 6	ditto	53	3 11 6
ditto	63	5 5 0	East Caradon	60	4 8 6
ditto	51	11 13 6	Prince of Wales	35	1 12 6
ditto	49	11 11 6	Wheal Friendship	12	2 2 6
Marke Valley	91	2 16 6	ditto	7	3 18 0
ditto	83	2 8 6	Belstone	19	6 8 6
ditto	69	3 8 6	Gonnamena	8	3 13 0

TOTAL PRODUCE.					
Devon Great Cons.	963	£2443 16 0	West Maria, &c.	122	£253 14 0
South Caradon	479	£1514 8 0	Bedford United	115	£401 16 6
Marke Valley	345	£1051 0 0	East Caradon	60	£265 10 0
Glasgow Caradon	205	£651 6 0	Prince of Wales	35	£56 17 6
Hington Down	193	£241 4 0	Wheal Friendship	19	£52 10 0
Wheal Crebor	164	£432 6 0	Belstone	19	£122 1 6
Gawton	133	£269 19 6	Gonnamena	8	£29 4 0

Average standard	£96 8 0	Average produce	6%
Average price per ton	£251	Quantity of fine copper	178 tons 4 cwt.
Quantity of ore	2851	Amount of money	£9339 5 0

LAST SALE.—Average standard £85 16 0/Average produce 7%
Standard of corresponding sale last month, £57 14 0—Produce, 7½%

COMPANIES BY WHOM THE ORES WERE PURCHASED.			
Names.	Tons.	Amount.	
Vivian and Sons	689½	£1301 0 3	
Grenfell and Sons	589	£2908 6 0	
Nevill, Druce, and Co.	469	£1067 3 0	
Williams, Foster, and Co.	323	£1106 6 0	
Mason and Elkington	354½	£1007 3 0	
Charles J. Lambert	426	£1459 0 0	
Total	2851	£9339 5 0	

NO SALE on Thursday last, December 27.

Copper ores for sale at Tabb's Hotel, Redruth, on Thursday next—Mines and parcels.—Mellaneur 511—West Tolgus 333—West Seton 201—East Pool 147—Levant 134—South Crofty 110—Carn Brea 30—Wheal Cornford 38—Kilbreth 24—West Roskear 21—Stephens's Ore 12—Wheal Grenville 10.—Total, 1689 tons.

DYNIN SLATE QUARRIES.

THE TEN PER CENT. INTEREST. due on the Debentures 1st January next, WILL BE PAID ON AND AFTER THAT DAY. Coupons must be lodged with the Secretary, 170, Mansion House Chambers, E.C., or with the Bankers, Messrs. RICHARDSON and CO., 11, Queen Victoria-street, E.C., three clear days.

The SECOND ISSUE of £6000, bearing INTEREST TEN PER CENT., will commence 15th January, 1878. ROBT. T. GEAR, Secretary.

BALANCE CHAINS.

LARGE QUANTITY OF CABLES (OLD) ON SALE.—Apply to GRIFFITHS and WILLIAMS, 6, Gore, Liverpool.

WANTED.—A CORNISHMAN, at present Resident Manager of a large COPPER MINING and SMELTING ESTABLISHMENT, will be OPEN to a RE-ENGAGEMENT in December. Speaks and writes French and German, and has some knowledge of Spanish. Unexceptionable references. Address, "Ass. Inst. C.E.," Elisabetha Goldberger, Oravica, Banat, Hungary.

LLANRWST LEAD MINE.

WANTED TO PURCHASE, ONE THOUSAND SHARES, or any portion of them. State number and lowest price.
OFFERS WANTED FOR— 10 West Chiverton.
25 East Craven Moor. 100 Medlyn Moor. 25 Lovell.
20 West Craven Moor. 20 East Chiverton. 30 Brynnaur Colliery.
Messrs. ENDEAN and CO., 85, GRACECHURCH STREET, E.C.

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THE ADVERTISER wishes to INVEST A SMALL SUM in MINING SHARES, whose prospects are such that a successful realisation of their objects would cause them to become very valuable. London shareholders need not apply.
Address, Mr. YARDE, Post Office, Ventnor, Isle of Wight.

FOR SALE, THE WHOLE OR PART:—

25 GORSEDD & MERL. £5 0 0	20 PATELEY BRIDGE	£4 0 0
20 HORNACHOS	100 VAN CONSOLS	0 10 0
2 LISBURN	100 TYN-Y-FRON	1 12 6
25 GLOUGWYNION	4 5 0	

Address, H. WILKINS, 3, Heyburne Villas, Tottenham, N.E.

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ZINC ORES.

ARMAND FALLIZE,
INGENIEUR-CIVIL, A LIEGE (BELGIUM).
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COPY OF REPORT.

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This opinion has been arrived at after several carefully executed practical tests, as well as from metallurgical assays.
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Notices to Correspondents.

* Much inconvenience having arisen in consequence of several of the Numbers during the past year being out of print, we recommend that the Journal should be kept on receipt; it then forms an accumulating useful work of reference.

GOVERNMENT INSPECTION OF MINES.—In his letter on this subject, published in last week's Journal, "Carbon" intended to have inserted the orthographical exercise set at the examination referred to, but omitted to enclose it; it is, however, of the kind set without any exception where the test is applied—the majority of the words being misspelled in order that the candidate's power to write correctly words in ordinary use may be judged of.

COMPRESSED FUEL.—Since the price of coal has declined much less appears to be heard about compressed fuel. May I, therefore, ask what is the average annual consumption in tons, and how much per ton such fuel made from South Yorkshire coal will sell for? Also, what has up to this time been found to be the best cementing material for holding the coal together?—R. T.

PESTLE AND MORTAR MACHINES.—"F. R." (Bla).—The machine referred to was tried to some extent during the Welsh gold mine, some 20 years ago, but never came largely into use. It is, probably, the worst form of machine that could be suggested, since the efficiency of the pestle and mortar depends less on the character of the motion than on the eye of the manipulator, bringing his pestle to bear on constantly varying points where unground particles are noticed. No machine could exercise judgment as to where the next blow or rub should be given.

COLLIERY MANAGERS' EXAMINATIONS.—"K. J. O." (Durham).—Probably the best work published available to the ordinary collier seeking to prepare for a Certificate of Competency is one by Mr. Hyslop. It was published by some bookseller at Wistow. The readiest means of obtaining it will be to apply to some Edinburgh or Glasgow house. The price was about 15s. Atkinson's book on Ventilation, &c., is out of print, but it was reprinted in America, and an American edition might, therefore, be obtained through Messrs. Trubner, of Ludgate-hill.

STONE-BREAKER.—"Inventor" (Bath).—The use of a double hopper, so as to crush on the back and forward stroke, would not be patentable unless there were something special in the mode of doing it. In Goo's man's arrangement the moveable jaws were fixed on a block of pear-shaped section, pivoted at the upper and narrower end. An eccentric shaft or crank passed through the lower end, so that at each revolution there was one stroke in each hopper. It worked very smoothly, but it was not found that such a hopper had been made for ascertaining whether more work was done for each one-horse power used than with the ordinary single-acting Blake.

PARIS EXHIBITION.—Being very anxious to exhibit at the forthcoming Paris Exhibition a new rock drill, which I have only just patented, and had not thought of in time to apply for space in the ordinary way, I should esteem it a great favour if any reader of the Journal would inform me of a vacant space. I am informed by the authorities that any applicant who has obtained space, and is unable through circumstances which may have since arisen to exhibit, has the privilege of transferring his allotment, and I should be very glad to receive such a transfer for any part of the machinery department.—P. B.

GELATINISED NITROGLYCERINE.—"H. C. B." (Shrewsbury).—This material has been for many months before the scientific world, and interesting descriptions of and papers upon it have appeared in the leading technical journals of France and Germany. Mr. Nobel discovered that by treatment with collodion nitroglycerine can readily be gelatinised into a tough material, much like jellies. The gelatinised nitroglycerine is nearly pure, for it only contains from 5 to 7 per cent. of foreign material—this latter being collodion which does not lessen the explosive character; indeed, it explodes as readily by concussion as ungelatinised nitroglycerine, but it is said that the nitroglycerine does not exude, which is likely as that of dynamite; and as it is not affected by water it would be useful for blowing up rocks and such like. Its transportation would require the same precautions and restrictions as nitroglycerine, dynamite, &c., and it is affected by the Explosives Act in the same way.

THE FLAGSTAFF.—Can it be true that Mr. Shell, who a few months ago filed a petition for the liquidation of the Flagstaff Company, has been appointed one of a committee for watching over the interests of the debenture holders?—A DEBENTURE HOLDER.

* We are compelled to postpone the reports of several Meetings.

SHARE DEALING.—We never interfere in the sale or purchase of shares; neither do we recommend any particular mine for investment or speculation, or broker through whom business should be transacted. The addresses of most of the latter appear in our advertising columns.

IMPORTANT NOTICE.—REDUCTION OF POSTAGE OF THE "MINING JOURNAL."—In consequence of the new POSTAL CONVENTION, which came into operation on July 1, the postage of the Mining Journal to many countries will be reduced to one-fourth. Henceforth the subscription will be 1s. 10s. 4d. per annum (30 frs.), postage included, for the following countries. The amount will, if desired, be collected at the subscriber's residence at the end of each year. The subscription continues until countermanded:—Austria, France, Belgium, Denmark (including Iceland and the Faroe Islands), Egypt, Germany, Gibraltar, Greece, Heligoland, Italy, Luxembourg, Netherlands, Norway, Portugal (including Madeira and the Azores), Roumania, Russia, Serbia, Sweden, Switzerland, United States, Malta, Turkey, Morocco, Tunis, and the Canary Islands. Spain 1s. 19s. (30 frs.).

THE SUPPLEMENTARY SHEET.—We have received occasional complaints, and of late a good many, that the Journal is delivered by country booksellers without the Supplement. Subscribers would oblige us by demanding that the paper should be handed to them complete, as every Journal is accompanied by the Supplement when it leaves our office, and the fault of omission must rest with the country bookseller or their London agent.

Received.—"C. W." (Cerro Preto).—"One Who Knows" (San Francisco).—"T. C." (Woodbury).—"H. D. H." (Paris).—"Shareholder" (Mr. Pearce at Dolcoath).—"W. Weston" (Colorado). Next week—"J. F." (Essex).—"Constant Reader" (Paris).—"Shareholder" (Llanrwst).—"E. M." (Cardiff). We could not spare space for such a statement; it would have no interest for our readers—"G. K." (Roek-Drills). Next week—"W." (Flagstaff).—"W. E. C."—"Shareholder" (Bristol).

AMERICAN SUBSCRIBERS.—In reply to several enquiries, it may be stated that subscribers in the United States can be supplied with three Mining Journals post free, at the price of \$5.00, gold per annum, payable in advance, by remitting to Mr. D. Van Nostrand, publisher, and importer of scientific books, &c., Murray-street, New York; or, direct to our Office, 28 Fleet-street, E.C.

THE MINING JOURNAL.

Railway and Commercial Gazette.

LONDON, DECEMBER 29, 1877.

COAL MINING IN 1877.

During the year now all but numbered with the past the coal trade of the kingdom has been most unsatisfactory, and in many instances disastrous, whilst the close of it leaves everything in a much worse state than it was at its commencement. The year 1877 has, indeed, not been one of the least eventful in our mining annals, for during it we have had all the characteristics of previous years that in any way relates to the working of collieries, including explosions of gas leading to a serious loss of life, the entire collapse of coal companies, heavy losses on the part of owners, strikes, disputes as to wages, with the addition of a new element—the limitation of production in mines—which is said to be the panacea for securing large profits to masters and high wages to the men. The solution of this most interesting problem, however, is not likely to be attempted just yet, even as an experiment. Still, it is evident that a great many new collieries have been opened out during the last two or three years that were not necessary, and as they are now being developed the question that naturally suggests itself is where markets are to be found for their produce. But this is not a question that can interest the general public further than to assure them that they are likely to have a superabundance of cheap coal as the result of the speculations of capitalists. That this cannot fail to be the case, we have only to look at things as they are at the present time. There are now some thousands of miners entirely idle, many more not working more than three or four days a week, yet more coal is actually being raised than is necessary for manufacturing, household, and every other purpose. In addition to this, new mines are now being sunk in nearly all directions, so that the early prospects of any material improvement in the price of coal that is likely to be permanent are anything but bright. Looking at the trade of the year, we do not think there will be an increase in the output of more than a million of tons over that of 1876, when the production was 133,344,766 tons, if, indeed, there is so much, for the home consumption has been very moderate, whilst there has been a decline in the amount of our exports. If we look to the home trade we find that the requirements for the making of pig have not been so large as in previous years in the North of England, Scotland, the Midlands, Staffordshire, South Wales, &c. Taking South Wales, where a good deal of distress has prevailed for some time, there has been a great falling off during the last couple of years in the make of pig, and consequently in the consumption of fuel, whilst many of the rolling mills are entirely standing. For this unfortunate state of things there is no doubt the men are to some extent responsible. As an example, we find that so recently as 1872 Merthyr Tydvil was as prosperous a place as could be found, the Cyfarthfa works of Mr.

Crawshaw being then in full operation. He had then 9 furnaces in blast, 72 puddling furnaces, and 6 rolling mills going, as well as a large number of men employed at his collieries. The furnaces and mills are now standing, and the place once teeming with busy life is now desolate, the men whom the proprietor was so proud of and so familiar with having been alienated from him by the promises and speeches of demagogues. The men at Cyfarthfa found out their mistake when it was too late, as was shown by the application made to Mr. Crawshaw as to his resuming work, and the pithy and sorrowful letter he addressed to them. Several of the companies have been heavy losers during the year, and it would almost appear also as if the full extent of misfortune has not been realised in the southern part of the Principality.

The Nant-y-Glo and Blaenau Company finding that they had lost seriously by their ironworks tried what could be done by attending to the collieries, and the result on the year's working has been a loss of nearly 45,000. With so much coal that could not be used for manufacturing purposes several of the colliery owners have been cultivating and extending their trade with the Metropolis, so that this year a much larger tonnage was sent there by railway than had ever been the case previously, the Great Western alone having taken upwards of 800,000 tons. At the present time, however, very many collieries are barely working half-time, whilst at Merthyr the miners are under notice, which will expire on Dec. 31. In the North of England there were considerable changes during the year. In June there was a strike, which for a time sent the trade into other districts. Despite this, however, business has been quiet, there having been a decrease in the tonnage exported to foreign countries, as well as the quantity sent by sea to the Metropolis, which was about 3,150,000 tons. It may be said that most firms have realised no profit whatever during the year, if, indeed, they have not been losers. Everything is in a depressed state, yet the men are on strike against a proposed reduction, which if not conceded will lead to the closing of many collieries, and an amount of distress that has not been experienced in the North of England for a number of years. The gross production of the mines in the counties of Northumberland and Durham for the year is estimated at 31,500,000 tons. The next field in importance, so far as relates to the yield, is Yorkshire, which in 1876 was credited with 15,055,275 tons of coal. Like most other districts, the West Riding has not been free from disputes or strikes on the part of the miners, who are admitted to be the best paid of any similar body in the kingdom. All things considered, they have been working very well, in the summer averaging fully four days a week, but it is not likely that the quantity raised during the year will exceed that of 1876. There has been a falling off in the tonnage sent from the Riding over the Great Northern to the Metropolis of about 60,000 tons as compared with the previous year, to some extent attributable to the carriage rate, although in March it was reduced 6d. per ton. Several new collieries were opened out to the coal during the year, which will increase the productive power of the West Riding by something like 1,750,000 tons per annum when they are in full operation, whilst others are being largely developed, and will also add extensively to the output during the ensuing year. Derbyshire and Nottingham form part of the same field, the Midland, which is continuous from Nottingham to Leeds, and the trade in those two counties has been anything but brisk, whilst a good deal of discontent has also prevailed. Derbyshire does the largest business with London of any county sending there by railway, and the year has been no exception to those that have preceded it. From Clay Cross alone there was sent upwards of 260,000 tons, but prices have ruled very low, and somewhat erratic.

In January the cost to consumers in the Metropolis was for Wallsend 28s., and Silketons 25s. to 26s. per ton. In February there was a reduction of 1s. a ton, but in May there was a rise again in Wallsend to 28s. In June Wallsend were 25s., but in September they were 27s. and 28s., in October 29s., and in the first week in November the price came down to 27s., and continued so up to the end of the Christmas week. Several of the collieries in Derbyshire have been worked without profit, if not at a loss, so that some companies have been unable to pay any dividend. Several new collieries have been sunk, whilst the Industrial Coal and Iron Company (Limited) who worked the Hasland and Stortford Collieries, near Chesterfield, and who had also sunk a considerable distance down near Sheffield towards the Silketon seam, have failed, the whole of the large capital having been entirely lost. Lancashire has been no exception to the rule which has prevailed in other districts, for trade has been dull, only occasionally relieved by a brief spasmodic reaction. As usual there have been strikes, and some explosions of fire-damp of a serious character, and the probability is that the output of coal for 1877 will not be much greater than it was in the previous years. The iron trade of South Staffordshire has been altogether very quiet, and this has affected the consumption of coal, for in former years the blast furnaces have absorbed at least one-eighth of the entire yield. Many pits have been kept but moderately going, and no change is expected when the New Year's work is commenced. South Staffordshire, it may be said, is an extensive feeder of the Birmingham Canal, which takes from it upwards of 3,200,000 tons in ordinary years for works in the mining districts through which it passes, as well as about 1,000,000 tons direct to Birmingham, but it is not expected that the returns will be quite so favourable when they officially appear for 1877. Proceeding more to the west we reach the Forest of Dean, where the greatest depression as well as suffering has prevailed, principally in the western part of it. Ten years ago the annual output of coal in the Forest was 848,000 tons, now it will not be much more than 640,000 tons. This decline, of course, affects not only the miners but ironworkers, and those engaged in the tin-plate trade. Higher up the ironstone works at Frampton Cretell have been stopped, whilst the blast-furnace at Ashton, near Bristol, is out owing to the slackness which has so long prevailed. In nearly every other district there are complaints as to the slackness which prevails, and at the unremunerative prices at which pig-iron and coal have to be sold. The falling off of the latter, owing to the diminished make of iron, has been most seriously felt, and is one of the leading causes of the depression in the coal trade, but which has been supplemented by the greater economy which is practised in our households, and to a slight extent by the decrease in our exports. With respect to the latter, there can be no mistake but what the German colliery owners are pushing us very hard, and will do so to a still greater extent, whilst France is doing all she can to develop her own minerals. This patent truth is not recognised by some who ought to be fully acquainted with it, for in a recent address by one of the best-known and noisiest of the miners' mob orators, whilst advocating the curtailing of the production of coal, he said—"I contend that we hold the control of the coal trade in Germany, France, and Belgium." Germany, it is true, has been our best customer, but this year there has been a falling off in the quantity she has taken from us of about 250,000 tons—a decrease of more than 15 per cent. for the year.

In Germany, too, since they commenced working coal there they have gone far ahead of us in the rate of production. If we take one field alone—that of Westphalia—we find there was raised in it in 1854 only 2,803,604 tons, whilst in 1876 the output had increased to 17,636,757 tons, being at the rate of more than 600 per cent. On the other side we find then in 1854 there was produced in the United Kingdom 64,661,401 tons, and in 1876 it had advanced to 133,344,766 tons—an increase not quite equal to 106½ per cent.; or to put it in another way, it will be seen that in 1854 England raised nearly twenty-three times as much coal as Westphalia, and in 1876 it only raised a little more than seven and a half times as much; yet forsooth we are told—or rather the miners are—that we hold the control of the coal trade in Germany. Our exports this year with France have also declined in a marked manner, whilst we do very little with Belgium, which is an exporting country. This shows how reckless or ignorant some persons are who presume to speak with authority on a subject which there is no difficulty in obtaining the most accurate information. So far, however, as regards the coal trade of the country, no change for the better can be expected so long as there is such a very moderate demand for both pig and manufactured iron. Cheap coal, however, produces cheap iron, and it is from this circumstance that we must look forward hope-

fully to the much better demand for the one that will necessitate a greater increase in the consumption of the other.

ARMOUR PLATES FOR WAR VESSELS.

There is every probability that before long we shall see a revolution in the mode of plating our war vessels, and that iron by itself will be entirely discarded. The heaviest iron plates as yet rolled are, we believe, 22 in. thick, and were made for the Italian Government, for their monster turret ships—the Diulio and the Dandolo—guns, but it is said that one of them is to be sheathed with 36-inch plates, which would be invulnerable against any known guns. Experience so far has shown that our heaviest guns can pierce 26 or 28 in. of solid iron, but there must be a limit to the thickness of plates if buoyancy and speed are to be taken into consideration, and hence it is that efforts have been made to introduce steel plates, or those made of steel welded on iron. Our best known makers of steel and iron plates have for some time past been trying to obtain an amalgam of the two that will have a greater resisting power in a given thickness than has hitherto been obtained from iron alone. So far as experiments have been made with heavy guns against armour plates the results have been in favour of the former, and we have no vessel afloat, even if we include the Indefatigable, with its 24 in. of iron, that could stand against the 100-ton guns of Sir W. Armstrong, as manufactured by him for the Italian Government. This was shown by the experiments made last year at Spezzia, when the targets, consisting of 22 in. of metal, with about 29 in. of timber backing, and behind that a thin skin of metal, were penetrated by the 2000 lbs. projectile from the Armstrong gun. Steel plates were also tried, it appears, and they prevented the projectile from penetrating through the entire of the timber backing, although they were more shattered than the iron ones.

From this it has been assumed, and very fairly we think, that steel in connection with iron can be so constructed as to give a greater resisting power to heavy projectiles than iron alone, and at the same time considerably reducing the weight of the armour of the vessel, and so ensuring greater speed than can be expected from an armour clad ship with 24 to 28 inches of iron solely. With the view of securing that object last year Mr. Wilson, the managing director of Cammell and Co., of the Cyclops Works, Sheffield, took out a patent for compound plates. In these the iron and steel are welded together, and the plates can be made to give an iron face and back, with steel in the middle, but he can also give a steel face to the iron itself. In August last at Shoeburyness some of these plates were tried, and the resisting power was found to be greater than that of the ordinary iron plates. The compound plates are simple in construction, for the steel in its fluid state is poured on to the iron plate, which has been raised to a welding heat; or where a central layer is required two iron plates are placed in a vertical position, and the molten steel is poured in between them. At the works of Sir J. Brown and Co., Sheffield, compound plates have also been made, whilst Sir J. Whitworth, of Manchester, has made some plates of compressed steel, which he considers are superior to those of iron, or steel and iron combined. Last week experiments were made at Portsmouth with the plates of steel and iron of Mr. Wilson, and with the ingeniously made plates of steel by Sir J. Whitworth, but, as is often the case with first experiments the plates do not appear to be all that could be desired; but sufficient was shown to cause our Government to pause before clothing any more of our war vessels with plates entirely made of wrought-iron. A series of experiments, we believe, will shortly be made, and after the experience of last week, limited as it was, we are certainly of opinion that steel plates, or a combination of steel and iron, will be found superior to those made of the latter material only.

RAILWAY IRON IN 1877.

The year through which we have been groping our way has now very nearly run its course, and before our next impression has seen the light we shall have entered upon 1878. At the close of every year the merchant takes stock in his business, and the journalist naturally takes stock also of the course of public affairs. Our attention being more particularly directed to coal, iron, copper, and tin, we are naturally disposed to ask, "What has been the course of the railway iron trade in 1877?" As regards home railways, the past year has not been a very eventful period. Traffics have not made much progress, but still they have held their own, and have even slightly expanded. Moreover, as coal, iron, and other materials used in railway working have somewhat declined in price, current expenses have been reduced; and as home railway credit has sensibly strengthened during the last six or seven years directors have been encouraged to proceed with duplications and sidings, to say nothing of extensions. So far, then, as the home railway world is concerned 1877 has probably been a tolerably good year as regards the demand for rails and accessories, but the weak feature in affairs has been the low price at which the rails sold have been disposed of. A similar remark applies to the exports of railway iron which have been effected this year. Thus the 456,037 tons of railway iron exported to November 30 this year were valued at only 3,562,133s., the 388,670 tons sent abroad in the corresponding period of 1876 being priced at 3,436,071s. It will be seen that while our exports of railway iron increased in the first eleven months to the extent of 69,387 tons the value of the exports was only augmented by the comparatively small sum of 76,042s. Although the cost of producing rails has been sensibly diminished by improvements in machinery, reductions in the price of coal, and economies in the important matter of labour, still the fall in selling prices has been so serious that the profits realised in 1877 from the manufacture of railway iron must have become sensibly smaller, although they were comparatively meagre in 1876. It is right, perhaps, to remark that the expression "railway iron" must be taken as implying generally steel as well as iron rails. Russia imported 79,986 tons of our railway iron in the first eleven months of 1877, and Australia 77,091 tons; but the proportion of steel rails imported by Russia having been somewhat larger, the value of the railway iron received by Russia to November 30 this year was 714,244s., while the corresponding value of the railway iron imported by Australia in the same period was 626,823s. The best external customers for our railway iron in the first eleven months of 1877 were Russia, Sweden, British India, and Australia, the total value of the exports made to each of these countries or colonies to November 30 this year having been as annexed:—Russia, 714,244s.; Sweden, 409,275s.; British India, 505,948s.; and Australia, 626,823s. The value of the exports made to British America in the first eleven months of this year was 298,965s., but a total of 200,000s. and upwards was not attained by any other country.

In dealing with 1877 we must act upon the principle of welcoming the coming as well as speeding the parting guest. We proceed, then, to make a few observations upon the prospects which 1878 presents for the producers of railway iron. As regard the American demand, it appears likely to be just as feeble in 1878 as it has been in 1877, and as it was in 1876. The great trunk railroads of the United States have, probably, been brought into a somewhat stronger position by the advances which have been recently made in freight rates, but the railway interest of the United States has not yet fully recovered from the disastrous panic of 1873; and apart from this consideration, we must also bear in mind the fact that the heavy protective tariff imposed upon foreign iron entering the United States has virtually driven English iron from American markets. It appears probable that, as in 1877, so in 1878, the colonial demand for rails will be the mainstay of the British iron trade. With regard to this colonial demand, the outlook is certainly hopeful, as great vigour is being impressed on the work of Indian railway construction, while in Australia the railway engineer will not be idle.

LIQUEFACTION OF OXYGEN.—Students of chemistry will be interested by the following telegram from Prof. Pictet, of Geneva, which has been received by Prof. Tyndall:—"Oxygene liquide s'ameliore par acides sulfureux et carboniques combines. Pression

320 atmosphères. Température 100° Centigrade de froid." Hitherto all attempts to liquify oxygen have failed.

DORMANT ENTERPRISE.—The dulness which has characterised joint-stock enterprise during the last three years remains as marked as ever. With the approach of a new year there are no indications of returning vitality, nor are there any signs of a restoration of that confidence on the part of investors the re-establishment of which is so much needed. Although there have been a number of concerns registered under the Limited Liability Acts, only a small proportion of these have advanced beyond that formal stage, and if the co-operation of the public has been sought the mode of seeking it has been private, if not altogether *sub rosa*. While, on the one hand, it is urged that joint-stock enterprise in any form is, for the nonce, distasteful to the public, it is also suggested that were the laws regulating the principle of limited liability simple and efficacious public attention would be permanently attracted in its direction, and enterprise of this kind would flourish as a bay tree. The Select Committee which undertook the investigation of the whole subject do not seem to have arrived at any very satisfactory conclusion upon the subject. Suggestions have been made, and will, doubtless be regarded, but after all we are left much as we were before. It seems to be admitted that under the existing law the lender or investor has not sufficient control over his capital, and also that his interests are but insufficiently protected. When a man has lost his money he not unfrequently clamours for laws which shall protect his pocket as rigidly as his person. There has been an epidemic of this kind lately. In other departments of commerce and finance the cry of the pigeon praying to be delivered from the hawk has been heard, and the bird of prey has suffered severely when brought within the meshes of the legal net. In joint-stock enterprise, as in other financial operations, there are always to be found unprincipled persons willing and ready to take advantage of cupidity, and these schemers have, no doubt, found the Joint-Stock Acts elastic enough for their purpose, but for all that they have been materially assisted in their plans by the credulity and greed of their victims. Until the legal provisions of the Acts of 1862 and 1867 are rendered so clear that misconstruction is impossible, a state of things suggestive of Eutopia, rogues will continue to exist, and lawyers will constantly have employment. The real remedy, however, in our opinion lies more in the hands of the investors themselves. It is not by rejecting every project brought under their notice that they will benefit themselves, for this policy is puerile and childish. It is by a careful and weighty consideration of the alleged facts by an inquiry into the antecedents of directors, and it is by an attention to detail of this kind that they are to be protected. Legislation may, and no doubt will, effect some useful minor changes, but it helps those best who help themselves. The falsehood and fraud which have led to the temporary collapse of a useful principle are to be regretted, but it is also a matter for concern that a system which is capable of being used with advantage to the community at large should languish and decay because of the chicanery practised in its name.

THE GLOBE ROCK DRILL.—In the Supplement to this day's Journal will be found some interesting particulars concerning the Globe Rock Drill (an improvement upon the Winchester drill) which has already proved itself to be the fastest drill in America, although this is the first publication in this country. The new drill, which is manufactured by the Globe Rock Drill and Motor Company of Boston, is only 22 in. in length, and its cylinder is but 4 in. diameter, yet it has been proved by experience that it will pierce hard flint rock with greater rapidity than the large tunnel drills at present in use. It delivers 1000 blows per minute, and it is not liable to get out of order or require to be laid up for repairs. The value of the Globe drill as compared with others in use will be seen from the map which accompanies the description, and shows that in speed the drill is without a rival.

COAL AND IRON IN THE UNITED STATES.—The pig-iron trade has ruled quiet at Pittsburgh, Pennsylvania; the demand is not so active as it was a month since, and is confined principally to small lots. Prices are generally unchanged, but they are, if anything, rather weaker. The demand for all descriptions of manufactured iron at Pittsburgh is not so active as it was a month since; most of the mills are, however, working double turn, many of them having fallen in arrears with their orders. A few recent failures which have taken place are largely attributed to the unremunerative prices which have prevailed. There has been a fair demand for wrought-iron pipes at Pittsburgh, although orders are not so plentiful as they were a month since. The steel market at Pittsburgh has continued quiet, but there has been a fair degree of activity. Manufacturers are generally pretty well off for orders, but they complain very much of the scanty profits which present prices leave them. The demand for scrap iron has fallen off to some extent at Pittsburgh. The production of anthracite coal in Pennsylvania to Nov. 24 this year was 13,285,735 tons, as compared with 16,717,099 tons in the corresponding period of 1876, showing an increase of 1,568,436 tons this year. The production of bituminous coal in Pennsylvania to Nov. 24 this year was 3,263,328 tons, as compared with 3,348,523 tons in the corresponding period of 1876.

REPORT FROM THE NORTH OF ENGLAND.

Dec. 27.—Although there has been an iron market held at Middlesbrough to-day—adjourned from Tuesday in consequence of Christmas—it has been little else than a formal affair, the attendance being extremely scanty, and the business very small. There is little or no disposition to do business now at any time, but at this holiday season such a feeling reduces commerce almost to zero. Most of the mills and forges are laid off this week, so that the production of iron will be much less than usual. Prices are nominally the same as those quoted a week ago, makers adhering firmly to 41s. per ton No. 3, and other qualities in proportion. Merchants, however, are still able slightly to undersell makers, and are, therefore, more sought after by intending consumers. The quarterly returns of the board of arbitration in the manufactured iron trade up to the end of November have just been issued. They show that the total weight of iron invoiced during that time by the firms in connection with the board—representing 90 per cent. of all the iron manufacturers of the North—has only been 97,804 tons, as compared with 99,286 tons for the previous quarter. In ship-plates there has been a decline from 55,900 tons to 51,439 tons in production, and from 61.19s. 4d. to 61.15s. 8d. in selling price. There has been an increase from 8897 tons to 9628 tons in rails, but a decline from 57.19s. 10d. to 57.15s. 3d. in selling price. Angles have increased from 14,718 tons to 16,797 tons, but the price has fallen from 67.7s. 11s. to 67.2s. 9d. There is also a trifling increase in the production of bars, which, however, have declined in price to the extent of 2s. 9d. per ton. The return just issued will amply justify the employers in the demand they have made for a further reduction of ironworkers' wages. That reduction will be considered during the next quarter, but no variation of the present rate can take place until the end of March. The mineral traffic receipts of the North-Eastern Railway for the week ending Saturday last show an increase of 1189%, as compared with the corresponding week of 1876.

Although not yet issued, there is good reason to believe that the Cleveland ironmasters' returns for the year 1877 will show an increased production of pig-iron (probably to the extent of 60,000 tons), as compared with 1876. This increase has, however, been accompanied by the maintenance of an abnormally low and unremunerative range of prices, and makers generally have sustained considerable loss. There are now four fewer furnaces in blast than at this time last year, and it is probable that some other furnaces will soon be extinguished. The output of Cleveland iron ore will not differ much from that of last year, but it is noticeable that the output during the last six months of the year has been much less than that of the first six months, and some half-a-dozen large mines are now entirely idle.

Lead mining has been pursued very steadily during the year both in Durham and Northumberland. The output of the principal firms, such as W. B. Beaumont's and the London Lead Company,

will not vary much in comparison with last year; and as only one or two new adventurers have come into the field, the total production may be estimated at something like 25,000 tons. The London Lead Company, under the energetic management of Mr. Bainbridge, have added considerably to their power of production, and have introduced several notable improvements in the different processes.

The Durham Coal Trade has passed through a year of great trial and tribulation; more so, indeed, than the oldest coalowner can remember. Prices have fallen continuously throughout the year; until now the average of the whole at the pit's mouth will only be a fraction over 5s. per ton. Not only has there been considerable falling off in the local consumption, but the exports from the ports of the Tyne and Wear will be at least 1,000,000 tons less than those of last year. Happily the agreement arrived at as to a sliding scale has prevented a recurrence of feuds between coalowners and their men, and the latter continue to work at the minimum rate allowed by the scale. Some 20 collieries in Durham are altogether idle.

REPORT FROM CORNWALL.

Dec. 27.—In writing our review of the Western mining of 1876 we said—"We do not think the year has had a very seriously detrimental effect on the prospects of mining for the future, and December leaves us very nearly where January began." And we might say pretty much the same of 1877. In some respects it has been a worse year than its predecessor, but in others it has had its compensations, and we close the twelvemonth with a really brighter hope than we have long known. There does at length seem reason to hope that the turn in the tide so long looked for has come, and that the pinch of the foreign competitions is over. We have reason to believe, in fact, that in the desperate struggle which has been waged with Australia the "Old Country" has shown that she possesses superior "staying power"—to borrow a metaphor from the race course—while her competitor is gradually being winded. All we want now is that the supplies from abroad shall fall off, and then Cornish tin mines will soon recover a fair portion, though, perhaps, we can never again expect to see the days of the past. Well, if so, a steady prosperity is better than a fitful success, and if we can keep on the even tenor of our way there will be nothing to regret in the ups and downs of the time when Cornwall enjoyed a monopoly of production, for even then curiously enough the miners did not always have it their own way. We wish we could see the same prospects for the copper mines. These are more depressed at the present moment than they have been for years, and in their case we do not really know where to look for an indication of better days in store. It is all the worse, perhaps, that it is difficult to point to a special cause of interference in their case.

The mining interest has not had only its own special drawbacks to contend with in 1877. It has suffered, and suffered deeply, in common with all the great industries of the country, from the depression of trade which has brooded over Christendom so long. It has suffered, too, from the depressing influence of the war which has been raging in the East, and to which we may now venture to hope an end will speedily be put. There have been times when war has had a stimulating effect on the metal trades generally, and there were not wanting those who prophesied that the present war would have a beneficial influence upon the prospects of mining in the West in like manner. However, such has not been the case, and it is very evident that it is to the arts of peace—to the stimulation of manufactures and industry—that we have to look to create the large and steady demand, upon which alone prosperity can safely and surely be built.

In the matter of the tin standards we may repeat our remarks of last December: 1877 "has again disappointed expectations, and again does the end of the year leave us worse off than did its commencement." However, we attach very little importance to the last drop in the standard—or, rather, in the unofficial prices—and we assume that practically the year has ended very much where it began. In December, 1876, the standards were 71s. and 72s., but the current prices were somewhat under this, and 69s. and 70s. may be taken as about the figures with which the year commenced. And this is just the position at which the standards stood a few days ago, though now 4s. to 5s. lower prices are paid. From February onward to August there was a continual downward movement—steady, if slow—and in the latter month the standards were down as low as 60s. and 61s., figures that if long sustained would render all tin mining hopeless. Happily they were not long sustained. A rise came before the end of the month, and September and October followed the improvement up so vigorously that the slumbering spirit of speculation was awoke again, and in a few days the prices of the shares in leading tin mines doubled and trebled, and even made greater advance than that. The first week in November brought up the standards to 70s. and 71s., and since then there has been no reason to fear that the fluctuations which have taken place have been more than of the most temporary character. In the matter of immediate hope, therefore, 1877 does end better than did its predecessor.

The course of the copper standard does not give occasion for like encouraging reflections. During the first half of the year prices were fairly sustained, such as they were. At the first sale of the year the standard was 103s., and on Feb. 22 it touched its highest point—106s. 2s. It has not reached the 100s. since June, and in September fell to 86s. 18s. Fortunately, since then there has been some recovery, but it is really impossible at present prices for all except the very best copper mines to pay their way and declare a dividend. What the cause of this depression is we cannot say, but the smelters have as usual come in for some hard words, and if their course of action is comprehensible by themselves outsiders are utterly unable to understand upon what principle it is based.

Arsenic and other matters of mining produce have shared in the depression, and contributed their quota to the low ebb of mining enterprise.

And yet in the matter of dividends 1877 has exhibited some improvement over 1876. In the latter year there were 13 dividend-paying mines, against 17 in 1875, and 19 in 1874. This year there are 15 dividend mines, and the total dividends, as given, are very considerably in excess—68,004l., against 40,871l. We are by no means certain, however, that the amount set down as divided by the shareholders in Holmshush and Wheal Newton is correct—24,000l. for the adventurers in two mines which were not in the Dividend List in 1876 seems an enormous sum. However, that is what the total of the dividends declared per share on the nominal share capital in these concerns comes to. But even if we set them aside the dividends of 1877 are still substantially in excess of those of 1876, so that there has been some pecuniary proof given of the turn of the tide. The figures of the publicly announced dividends are:—

Mine.	Shares.	Per share.	Amount.
Dolcoath.....	4,295	£1 7 6	£5,907 0 0
Devon Great Consols.....	10,240	0 5 0	2,560 0 0
East Pool.....	6,400	0 8 6	2,720 0 0
Glasgow Caradon.....	40,000	0 1 0	2,000 0 0
Holmshush.....	60,000	0 4 6	13,500 0 0
North Bury.....	444	1 0 0	444 0 0
Pedn-an-drea.....	6,000	0 9 0	2,700 0 0
South Caradon.....	512	8 10 0	4,302 0 0
South Condurrow.....	6,123	0 16 0	4,898 0 0
Tincroft.....	6,000	0 10 0	3,000 0 0
West Chiverton.....	3,000	0 10 0	1,500 0 0
West Tolgus.....	512	7 10 0	3,840 0 0
Wheal Eliza.....	1,024	9 10 0	9,708 0 0
Wheal Prussia.....	6,000	0 1 0	300 0 0
Wheal Newton.....	25,000	0 8 6	10,625 0 0
Total.....			£68,004 0 0

We miss from this list Great Retallack, Gunnislake (Clitters), Marke Valley, and West Poldice, which declared dividends in 1876; and the only mines in Cornwall paying dividends at this moment which gave dividends in 1876 are Dolcoath, East Pool, Glasgow Caradon, South Caradon, South Condurrow, West Tolgus, and Wheal Eliza—seven only have thoroughly weathered the storm.

The calling list this year has been heavier than last. It includes Ding Dong, East Lovell, East Chiverton, Cook's Kitchen, New

Cook's Kitchen, West Frances, South Carn Brea, Wheal Bassett, Wheal Peever, West Seton, Killifreth, Medlyn Moor, West Wheal Eliza, Prince of Wales, Lovell, Wheal Grenville, Unity Wood, Trebeigh Consols, Treleigh Wood, South Wheal Crofty, Carn Brea, West Maria and Fortescue, Bedford United, Blue Hills, Wheal Russell, New Hendra, West Godolphin, Marke Valley, Pomerby Croft, Providence, East Caradon, North Traskerby, Combmartin, Crebor, South Tolcarne, Gawton, Spear Moor, South Francia, Wheal Lovell, Wheal Agar, Levant, Wheal Owles, Wheal Uny, and Bedford United.

However, in several instances the need for calls was only temporary, and some of the mines named have not only since then made good their positions, but have commenced to make handsome profits. Wheal Peever is one of the most notable examples, although with other mines it not only suffered severely at the commencement of the year from the flooding caused by the heavy rains, but was completely drowned out. And there are several mines, and among them a few of first importance, which have neither paid dividends nor made calls; but are making small profits on the actual working, which would very soon turn into dividends with a little better price for produce.

It is hardly necessary to say that 1877 has not been remarkable for the starting of new ventures. It has not, however, on the other hand seen the collapse of many old ones, and thus, so far as the number of mines is concerned, also the year closes just where it began. We have not yet before us the statistics of the ore raised, but there is every reason to believe that in this respect there was no falling off. Possibly in black tin there was an increase. Great Wheal Vor, after a gallant struggle, has succumbed, and two or three mines only around Helston now keep mining alive in that once famous centre. The glory of Trumpet also has departed, but there are hopes that East Lovell may once again turn up trumps. The greatest collapse has, however, been at New Consols, where the experiment of treating mixed ores in the wet way was being carried out on the most gigantic, and it was understood, on the most successful scale. The facts are not all before us, and perhaps never will be, but so far as they can be gleaned the real difficulties would seem to have been financial rather than practical. It is very unfortunate that the chemical system of dressing has always been weighed in this fashion whenever it has been tried in the West. However, the district has had its slice of luck in the extraordinary discovery of silver ores at Wheal Newton, of which, however, little has been heard of late.

If "the day is not far distant when in all well regulated mines hand boring will have become a thing of the past," as we said last year, 1877 cannot be said to have done very much to hasten it. The problem was solved in 1876 by the successful introduction of the Barrow borer at Dolcoath. The work of 1877 in this direction has been to show the excellent work of the percussion drill of the Diamond Rock-Boring Company at Carn Brea. But we are still without any means whatever of judging between the two machines. Either is better and cheaper than hand boring, and that is all we can say. Miners want to know which is best, and oddly enough when the trial of rock-borers took place in connection with the first exhibition of the Mining Institute the Beaumont was not represented, and the Barrow would not work; 1878 ought to produce some results. Not only will the Beaumont and Barrow be at work as before but the McKean at Roskear, and the Darlington at Wheal Agar, and by-and-bye probably the Ingersoll, which did admirably both at the Mining Institute and the Polytechnic trials.

The annual exhibition of the Royal Cornwall Polytechnic Society was unusually good and successful, and the Cornwall Mining Institute, following in the wake of the older society, have had an exhibition of mining implements, &c., at Camborne, which also met with the most gratifying success. As we have said before, there is ample room for both, and the only result can be for the benefit of practical mining. The other county scientific associations have, as usual, been doing steady work—notably the Miners' Association; and in August the county was visited by a number of scientific gentlemen, who came West in connection with the meeting of the British Association at Plymouth. And, by the way, the question of the adaptability of the telephone to mining purposes was first solved shortly after the experiments at Wheal Eliza.

The clay trade has been very dull, and several of the works have been suspended, while a number of the labourers have been employed in breaking up waste land for cultivation. The strike of 1876 has left some results behind, but there has been no disturbance during 1877. Successful experiments have been made by the Messrs. Stocker with the view of introducing hydraulic machinery.

Considerable excitement was caused a few weeks since by the publication of a letter in a London paper by Miss A. W. Buckland, stating that the distress among the miners in Cornwall was of such a character as to call for outside help, like the Indian famine. This led to Mr. T. S. Bolitho reassembling the old County Relief Committee, and to the appointment of sub-committees to enquire into the real condition of affairs in the different districts. These enquiries have shown that in Cornwall, as elsewhere, there is a great deal of distress, though not to the extent and of the special character at first stated. The funds in the hands of the Relief Committee will, therefore, be distributed, and through that committee it is clearly advisable to prevent imposition that all organised help should go.

We could not close this brief review of 1877 without reference to an unfortunate series of occurrences which have caused much ill feeling and have wrought considerable harm to Cornish mining. We allude to the Bassett, Tincroft, and Carn Brea financial revelations. But we do not intend to allude to them at any length. The lesson has been taught—and, we believe, has been learnt—that however good a man's motives may be, and no one can imagine that in either of these cases anything sinister was intended, no mine manager has a right in any way to deceive the adventurers as to the financial position of their property, or to keep back from them all information necessary to enable them rightly and thoroughly to understand the position of their property. We have said that the lesson has been learnt, and we have no fear that 1878 will in this respect repeat 1877.

REPORT FROM MONMOUTHSHIRE AND SOUTH WALES.

Dec. 28.—The distress prevailing in the district appears to intensify rather than abate, and sad tales are told of destitution. Local efforts are being made to help those who are suffering from the depression in trade. Sup kitchens have been opened, and other means to relieve the distressed have been resorted to; but still these efforts are insufficient to meet the case. At the local iron and steel works the same enhanced amount of activity is observable, but prices are so low that it is impossible almost to make a profit, and quotations for Welsh bars have declined to considerably more than over half of what they stood at in 1873. A year of unparalleled depression has just closed, and there appears to be no prospect, or at any rate any immediate one, of trade improving; and although this district will probably secure a fair share of orders for the home railways (for re-laying), which are expected shortly to be given out, the rate at which these will be taken will not, it is feared, be in advance of present prices. With the exception of the blast furnaces, the works are inactive at Victoria, near Ebbw Vale. At the steel-making establishments there is about the usual amount of work in hand. Of course the occurrence of the Christmas holidays has tended to reduce the work this week, but not to any very great extent. Bars are in slow request for foreign exportation. The slight improvement in the tin-plate trade continues, and is felt more in the western section of the district. There are no signs of a re-start at the works now so long closed in Monmouthshire.

There is no change of importance in the coal industry, but last week a little more activity was observable at some of the local pits. This, however, applies but to very few cases, and in one instance I could mention a colliery has been kept going only 17 days in the course of six weeks, and in the other only 13 days out of a month. Meetings have been held, and although the proceedings have not been published, it is evident that the masters are desirous of modifying the sliding scale arrangement. As a matter of fact, it is impossible in the face of present circumstances for employers to pay

even the minimum standard of wages now in force, and it is to be hoped the men will meet them in a conciliatory spirit, and consent to a reduction, which may be only temporary. The demand for steam qualities is up to about the recent average, but house qualities are in fair request, the weather being cold. A slight improvement has taken place in the patent fuel trade. Shipments have been rather larger during the last week or so, but the works are, as a rule, badly employed. The men at the Rhydydefaid Colliery, Killay, Swansea, have resumed work, and those of the Cefn Jolen pit have adopted a similar course, the latter accepting a reduction of 7½ per cent.

The directors of Richards and Co. (Limited) have again recommended a satisfactory dividend. The report issued for the year ending Sept. 30 recommended a distribution at the rate of 10 per cent. per annum, and this in the face of the universal depression which has prevailed in trade. The directors congratulate the shareholders on this fact. The Llanharan Collieries have remained closed throughout the 12 months, but the other branches of the company's business have been vigorously prosecuted, and with profitable results. After providing for the dividend named a balance of 1300*l.* remains to be carried forward.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

Dec. 27.—To notice the state of trade in the whole or in any part of the Midland coal field, and of the ironworks connected with it, is entirely out of the question, for during the Christmas week little or nothing is done in the shape of work. Men may have been working short time for months, but somehow or other they appear to be able to get funds to keep the Christmas carnival or carousal. This is especially the case with the coal miners of Yorkshire and the hardware hands of Sheffield. The publicans, as a rule, are very kind to them, for they manage to get up sports during three or four days in the week to occupy them during daylight, after which they retire to the hostleries to discuss the sporting events they have witnessed, whether in the shape of a handicap footrace, pigeon shooting, knur and spell, or any other "little game" capable of creating excitement, or on which a few shillings can be betted. In Derbyshire the men have only at some few places been doing sufficient to make any provision for spending a week in idleness, and the luxuries peculiar to miners, but in South Yorkshire they have been better off as a rule, so that there has been a fair expenditure of money, although not equal to that of some previous years. The week, however, may be looked upon as all but a blank, so far as work and earnings are concerned. Next week, however, there will be a fair start, and with the change of the weather, with snow and frost instead of rain and mud, there ought to be a much better demand for house coal than there has been, for stocks will have been sunk considerably whilst the collier has been away from the pit, and Paterfamilias will think it necessary to see the state of his coal cellar. If it is at all low he will do well to have it replenished, for he is not likely to be able to purchase it below its present price. Silketone being only from 24*s.* to 25*s.* a ton delivered. That price, however, is likely to go up consequent on so many collieries being closed in the Newcastle district, where the men do not show any disposition to accept the 12½ per cent. reduction. This, of course, will make it so much better for those districts where there are no disputes, and will, consequently, benefit both Derbyshire and South Yorkshire in particular.

During the greater part of the year nearly all the Sheffield branches were remarkably dull, and whilst many workmen were altogether idle, more were only working short time. The last quarter, however, inaugurated a better state of things, and before half of it had passed over some branches became really active, and left off so. This was the case with respect to the Bessemer establishments, which were scarcely ever busier than during November and December, and left off for the holidays with plenty of work in hand. Table and other cutlery was in more active request for our own as well as other markets, as were also other descriptions of steel goods peculiar to Sheffield. The new year will, consequently, open out more favourably than was expected a short time since in several departments. The heavier branches of trade, however, have been dull, and just at present there is no likelihood of any improvement taking place.

In South Yorkshire, where during a considerable part of 1877 strikes prevailed at the collieries in one place or another, the new year will open out favourably, and it is expected, entirely free from all disputes. Trade, too, is likely to be better in consequence, and, owing to the strikes and complications in other mining districts, very little coal was sent away by railway during the early part of the week, the railway companies no doubt being more profitably employed in conveying excursionists and the good things that "Father Christmas" generally provides for his fortunate children in all parts of the kingdom. Now, however, the "black diamonds" will be again in the ascendant, seeing that stocks of merchants will have sensibly declined. The well known Oaks Colliery, near Barnsley, will be stopped for a fortnight, owing to the state of affairs at the Atlas Works, Sheffield (Sir J. Brown and Co.), where about 1000 ironworkers recently received notice, as well as repairs required at the steel works at Penistone. The colliery is the property of the company, who are the owners of the two works named. At the Dodworth Silketone Colliery, Barnsley, where the men have been on strike 37 weeks, an arrangement has been come to through the intervention of Mr. Mundella, who acted for the men, with Mr. Whitworth on the other side. It was agreed that the men should resume work on the terms proposed by the owners some time since. The dispute at the Corton Wood Colliery, near to Wombwell, which has also lasted for some time, has been referred to arbitration, and it is expected it will be adjusted so as to allow of the men resuming work very shortly.

REPORT FROM NORTH WALES, SALOP, AND CARDIGAN.

Dec. 26.—The demand for coal of various kinds is somewhat better, but not nearly equal to the capabilities of the collieries, and thus far prices are barely remunerative. An effort has been made by some of the largest shareholders to convert the New British Iron Company into a limited liability company. They had a majority of shares, but not of personal votes, and to secure the latter they transferred portions of their shares to other persons. The directors refused to register the transfers, and the case was brought before the Vice-Chancellor on Dec. 18 and 19. His lordship thought the directors could not sustain their refusal to register the transfers, but reserved his final judgment until January 21. It is pleasant at this season of the year to notice the efforts recently made by employers and others to provide for the rational recreation and improvement of workmen. One of the most noticeable of these in this district is the establishment of a "British Workman Public House" at Bronygarth, near Chirk, by the Messrs. Barnes (Father and Son), who are among the principal proprietors of the Quinta Colliery. The house is used by the colliers from that, and also from the Reesgwyn, Brynkinnall, and Black Collieries. It is provided with newspapers, books, and material for games. It has a public room where concerts and lectures are given, and is provided with stabling for the accommodation of the teams frequenting the adjacent lime works.

In a recent popular lecture on geology, Mr. D. C. Davies, F.G.S., of Oswestry, made a suggestion that might be acted on to advantage in other colliery districts. Speaking to the lads and young men of the amount of time they had on their hands after they had left the pits, he said a portion of this might be well employed in the collection of the plant remains that lie in the rubbish heaps of the collieries, and as one or more different coal seams were worked at each colliery the characteristic plants of each seam through the whole series from bottom to top might be classified by those who understood them. Capt. and Mrs. J. R. Barnes at once offered a room for the arrangement of such a collection, but it remains to be seen if the suggestion will meet with any response. A similar club room is just going to be opened for the colliery and quarry men of Trefonen, south-west of Oswestry, chiefly through the exertions of the clergyman of the parish.

The Festiniog Narrow Gauge Railway has enjoyed great freedom from accidents since its construction, but on the 18th inst. David

Evans got jammed between two slate waggons and received injuries that caused his death. A new carriage with a radiating axle has been introduced on the North Wales Narrow Gauge Railway by which long carriages may travel around sharp curves with ease.

The Slate Trade keeps good. The stocks at the great railway slate depôt of the London and North Western Railway at Mold Junction are low, and loading is going on.

When in writing of the Llanrwst district a fortnight ago I recommended the driving of the deep adit under the Pencraig Mines I did not know that that mine was being brought out under the auspices of the Betts-y-Coed Mine Company; I wish them success. Twenty years ago I saw good ribs of lead in the lodes of that mine at a shallow depth, and I have long been wishful to see the district proved in depth. It is not well to meddle in a dispute, but while referring to the Llanrwst district I may be allowed to express the opinion held among mining men there that, first, it is not well for mine brokers to cry up one set of mine shares by depreciating others; and, secondly, when mine promoters make very great promises that are very tardily of fulfilment they fairly lay themselves open to animadversion. In Salop the chief interest gathers about West Tankerville, and if the improvement that has taken place continues the success of the mine is secure.

Experiments with the telephone were made on Sunday week between Holyhead and Dublin. The instruments were connected with the cable, and the messages conveyed were heard intelligibly at either end. The distance, 47 miles, is the longest sub-marine length along which telephones have as yet been conveyed. In Montgomery and Cardigan there is little to notice unless it be the dissatisfaction that is finding expression among the shareholders of the Great West Van.

REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

Dec. 27.—This week business at the collieries and the ironworks throughout South Staffordshire has been suspended on account of the Christmas holidays. And many of the collieries and ironworks will, in consequence of the difficulty of securing orders, remain closed longer than is usual. When business is begun again the demand for forge coal will show a falling off, for production at the mills and forges is being curtailed. The blast-furnaces have continued blowing during the week. The supply of pigs is much in excess of requirements.

Three finished ironworks have been in definitely closed this week. The two largest are the Shrubbery and the Swan Garden Works, in Wolverhampton, lately owned by Messrs. G. B. Thorneycroft and Co.; the other is the Crookhay Works at West Bromwich of Mr. H. O. Firmstone. The Shrubbery and Swan Garden Works combine in all 80 puddling-furnaces and 12 mills, and Mr. William Gibbs, mineral broker, of Wolverhampton, has become the legal purchaser. For whom, however, Mr. Gibbs is acting is at present a secret. Such a state of things as is here indicated has not been known in this district for many years, and the distress amongst the ironworkers is largely increased. The Bilston Brook Ironworks were to have been closed last Saturday, but some good orders having been secured they will be carried on.

A fact strikingly indicative that colliery concerns of even the very highest standing in South Staffordshire have not yet regained that public favour which they once enjoyed is afforded this week in connection with the Sandwell Park Colliery Company. The shares of this concern have sold since my last in one case at a premium of only 6*l.* 10*s.*, and later on at only 6*l.* Holders remain at 6½ premium, but sellers demand a further 1*l.* off. It will be remembered that almost the last transactions we recorded in these shares were at about 8*l.* premium. For a fortnight or so before this fall the shares had displayed no movement.

The opening up of the Walsall Wood Colliery continues with vigour. In the No. 2 shaft a depth of 585 yards has been sunk. The last 445 yards were got through in a year and two weeks, or a weekly average, including all stoppages, of 8½ yards. The rate of sinking for so long a period is stated to be without precedent in this if not in any district. The deep coal has been come upon at a depth of 545 yards. It is of excellent quality, and averages, without the roof coal, 5 ft. in thickness. Some 350 to 400 acres of this seam has been proved. The deep and shallow coals (the latter also about 5 ft. thick) are apart, as in the Brownhills and Cannock Chase district, being separated by about 15 yards of rock bind and other strong measures. Sinking is not at present going on in No. 1 pit, but it will now be resumed without delay. The prospects of the company are officially declared to be excellent. The outlay so far, considering the magnitude of the undertaking, has been moderate; yet it may be noted that the 6*l.* paid shares of this colliery are quoted by holders at 2½ *d.*s.

The trade of North Staffordshire is without alteration. The Coal-masters Association has resolved to render the Longton masters pecuniary support in enforcing the 10 per cent. reduction in wages. The existing trade depression is so great that the whole of the ironstone mines near Bedworth, the centre of the Warwickshire coal field, are closed. Vast stacks of ironstone are to be seen on some of the pit banks at Bedworth, and blast-furnaces erected there a few years back at a cost of many thousands of pounds have been for some time and still are blown out. The effects of the depression are severe.

Mr. Henry Johnson, the engineer of the Sandwell Park Colliery, with a view to test the requirements of the trade, raised during last week no less than 4167 statute tons, and it is gratifying to learn that he has sold the whole of it, with the exception of a little slack. To raise so much in six days from any shaft in the thick coal district of South Staffordshire is unprecedented; but as the capability of the engines is far above this quantity, we shall probably hear of still better work hereafter.

TRADE OF THE TYNE AND WEAR.

Dec. 26.—There has been considerable activity in the Coal Trade at the Tyne Dock during the week—particularly gas and steam coals have been shipped largely, the steam coal trade having improved on the Tyne and Wear in consequence of the strike in Northumberland. The winter has now set in with great severity, and this will no doubt improve the demand for house coal, as no stocks are held of this coal. The demand for coke is pretty steady, but for manufacturing coal the demand is extremely flat, and as most of the large ironworks and foundries have been stopped for a fortnight's holiday this trade cannot improve for some time to come. The stoppage of blast-furnaces which is going on will still further have a tendency to depress the trade. A number of works are going on in Northumberland, employing about 4000 men. In Durham the works are, on the whole, fairly employed, and many of them are putting out large quantities of coal daily; this is especially the case when the plant and shafts are arranged with due regard to all modern appliances and improvements. Since the strike at Ryhope was settled the works have been carried on with renewed energy; for a number of years the output of coal has been great at this remarkable colliery, varying from 1600 tons to 2600 tons per day, but lately this quantity has been considerably exceeded—3000 tons and upwards having been raised per day. As there are only two shafts, and the depth to the seam is 300 fms., the quantity raised must be considered extraordinary. At Silkworth, which adjoins Ryhope, the plant is very similar, and depth of shafts, &c., to Ryhope, and here 1600 tons are raised per day, and this will be increased until the quantity reaches 3000 tons per day and upwards, the second larger winding-engine is now in course of erection, and the drum in connection with it is intended to be spiral of the most improved type. This drum enables the engineer to dispense with the cumbersome apparatus connected with balance-chains; this drum has been much improved of late, and it is considered to be as safe as the ordinary drum, while it is constructed on scientific principles, and acts so that the engine has only to lift the actual weight of coal the whole length of the shaft, the gradation of the drum balancing accurately the ropes and cages.

The strike of the miners at the Steam Coal Collieries—the Associated Steam Collieries in Northumberland—has now continued a week, and as arrangements have been made by the officials to secure

as much support as possible, it is probable that the strike will be of long duration. The number of men on strike is comparatively small—about 8000, or one-eighth of the total number of miners in the district, still a large sum will be required weekly to support them. The strike we hold to be a mistake, as the masters cannot compete with other coals owing to the excessive cost they have to meet in raising the coal, and they have good reason to be annoyed with the slow and uncertain action, and also the heavy cost of arbitration. When the last arbitration took place, with such extraordinary results, the information collected clearly established this position.

REPORT FROM THE FOREST OF DEAN.

Dec. 27.—The Coal and Iron Trades of the Forest are still in a very unsatisfactory state, the coal trade especially being very variable within limited circumstances, some weeks giving hope by some activity, and then in a few days' time growing comparatively slack, and in this fitful way it mocks the hopes and fears of the proprietors and working colliers. A few of the iron mines on the eastern side of the Forest are fairly employed, but furnace operations are limited as for some time past. The stock of pig-iron, however, is being considerably reduced, which must, of course, be accepted as a favourable symptom. The forge and tin-plate operations are also characterised by the fitfulness which applies to the local coal trade, and just now orders are said to be slack.

The late reported distress still continues, but means are being used to alleviate the sufferings of those thrown out of work by the stoppage of works, some hundreds being already put upon what are called relief works—i.e., road making and mending—and others are being supplied with partial necessities from extra subscriptions or from private benevolence. The "pinch" is extensive over the Forest, but much more severely in West Dean than elsewhere. The weather having become much colder will try the very poor extremely, and yet in thinking of the local trades, especially of the coal trade, the change in the temperature is a welcome one, as being likely to lead to increased activity. An improvement steady in its character, instead of being so variable and fitful, would be extremely welcome, but the future is hid from our ken.

STEAM-ENGINES FOR TRAMWAY CARS.

The object of the improvements invented by Mr. ROBERT HEDLEY, of the Isle of Dogs, is to produce an engine better adapted for use on tramway cars, by mounting the whole steam-power on a single pair of wheels, the advantage gained being the use of any size, but more especially driving wheels of a large diameter; there is thus little or no interference with the easy traction or movement of the wheels. The weight upon the rails will always be equal whether the apparatus be moving or stationary. The employment of large wheels enables the principal portion of dead weight to be carried below their centres, while there being virtually but one axle or line of axle, the direction of such, in rounding curves, will always be that of a true radius to the centre of curves, and hence there will be no undue friction of the wheel flanges against the rails, flanges being central. He effects these improvements by slinging a vertical steam-boiler inside an annular ring, outside of which, and exactly opposite, are forged on, two studs or pins, the whole forming one piece and the one main axle. The wheels revolve loosely on said studs or pins, while the steam cylinders are attached to the outside or walls of the boiler. The crank shafts, feed water tanks, feed pumps, driver's platform, railings, &c., are carried on a framework attached to the boiler, and also through the intervention of springs and axle boxes to the one main axle of the apparatus.

The framework is extended so as to form an arm, which terminating in an eye swivels on a collar, stud, or pin secured to the underside of flooring of tram or other car, and thus this extension of frame forms at once a third point of support to the whole machine, and a drag bar to the cars or carriages, and permits great freedom for the whole moving power and cars, when coupled together, to accommodate themselves to the best possible positions when rounding curves. The steam power he applies to the wheels through the intervention of gearing, either cogged or frictional, and is thus enabled to drive his engines at a speed (say) from four to six times greater than that of the wheels; by this he gains a large degree of expansion, an easy method both of starting and stopping, and obviates all thumps and jerks on the rails. Owing to the high rate of speed at which he drives his engines he gains great expansion of steam, and which is thus so lowered that it escapes with but little if any noise, and it is still further reduced by passing it through the feed water tanks before finally conveying it to the hinder end of the cars through a pipe lying along the carriage roof and fitted with an air injector to quicken the fire-draft and still further condense the waste steam.

SAFETY-VALVES.—The invention of Mr. C. W. COLLINS, of Manchester, relates to safety-valves of the annular class, having external and internal lips or openings for the escape of the steam when applied to steam-boilers, and consists in constructing the moveable and stationary parts of the valve, commonly called the valve and seating, so that in proportion to the size a comparatively small area shall be exposed to the pressure of the steam, and an ample area opened for its escape. The moveable part of the valve is formed of one, two, or more narrow rings held together by ribs, each ring having at its bottom end two horizontal, angular, or curved edges or surfaces, one projecting below the other, and fitted to corresponding surfaces on the stationary or seating part of the valve, there being between the surfaces any required space for the escape of the steam when the valve is open. The narrow rings may be plain or solid, but he prefers them to have chambers open at the bottom to the steam. And in order (when desired) to have an area exposed to the steam as nearly equal as possible, whether the valve is open or shut, he makes the internal tops of the chamber about the same width as the distance between the outer sides of the edges or surfaces of the moveable part of the valve. These improved valves (according to the pressure at which the steam is to blow off) are weighted by dead weights or springs, lever weights or springs, or by any of the modes at present in use, but as the areas exposed to the steam are comparatively small in proportion to the diameters of the valves, the weights or pressures will be lessened in the same ratio, and it will be found that although the weights are comparatively light the steam can escape through passages having areas as large or larger than that of the pipe to which the valve is connected.

CLEANING AND SEPARATING METALLIC ORES.—The improved machinery invented by Mr. A. H. MAURICK, of Aberystwith, has for its object the cleaning and separating of metallic ores, minerals, and metals from any associated or intermixed impurities, and consists of a cylindrical or conical-shaped tub or barrel, inside which a vertical spindle is made to revolve. Attached to the spindle at intervals from the bottom to the top are arms or vanes fixed radially and horizontally, extending to the side of the tub, and set at an angle of 45° or any other convenient angle to the perpendicular. A mixture of ore or other materials to be cleaned or separated, and a sufficient quantity of water, is introduced into the tub, and the spindle and vanes being made to rotate, the ore or other material is forced to mount from the lower part of each vane to the top edge, on reaching which it falls again behind the vane to its former level. In thus falling in water the particles of ores, minerals, and metals having a higher specific gravity than the associated impurities fall most rapidly, and by the continued action of the machine are worked down to the bottom of the tub; all the substances so arranged themselves in the order of their specific gravity, the heaviest being at the bottom and the lightest at the top of the tub. The whole of the charge in the tub is acted upon by the vanes at the same time, and when the operation is complete the impure and lighter matters are removed through suitable valves, and the heavier ores in the same manner. In gold-producing ores the finest particles of metal will be separated by the action of the machine, and the gold be brought into continual contact with mercury placed at the bottom of the tub, the resulting amalgam being removed through valves, and the overlying impurities being first drawn off.

COAL MINES REGULATION ACT, 1872.**EXAMINATION FOR MANAGERS' CERTIFICATES OF COMPETENCY.**

DISTRICT UNDER THE CHARGE OF JAMES WILLIS, Esq.,
H.M. INSPECTOR OF MINES.

NOTICE IS HEREBY GIVEN, that an EXAMINATION for MANAGERS' CERTIFICATES OF COMPETENCY, under the above-mentioned Act, will be HELD on the 2nd and 3rd days of January, 1878, and CANDIDATES INTENDING TO PRESENT THEMSELVES at such Examination must, on or before the 29th day of December, notify such intention to the Secretary of the Board of the above-mentioned District, from whom all information as to particulars can be obtained.

By order of the Board,
GEO. SOUTHERN, Secretary,
17, Portland-terrace, Newcastle-on-Tyne.
N.B.—Persons who do not reside within the District are equally eligible for examination with those who do.

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Dec. 19, 1877.

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MR. BERRYMAN WILL OFFER FOR SALE, BY AUCTION, on the Mine, on Wednesday, the 9th January next, at Eleven o'clock A.M., ALL THE

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ONE 30 in. cylinder STAMPING ENGINE, with new nozzles, 2 bobs, 1 fly-wheel, 2 12-head stamps axles and lifters, and ONE good 10 ton BOILER.
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ONE 24 in. cylinder WHIM ENGINE, with fly-wheel, whim cage, wrought-iron shaft, &c., and an excellent BOILER, 9 tons.
ONE 18 in. cylinder WHIM ENGINE, with whim cage, and ONE 4½ ton BOILER. (The engines are all in good condition.)
2 shaft tackle; 4 10 ft. shieves, with wrought-iron arms; 4, 5, and 7 in. pumps, with poles and cases; a quantity of bridge rail iron; 2 pulverisers; 5 round bobbles, with shafting and driving gear; 1 dry tube, 3 ft. diameter and 20 ft. long; iron tram wagon, strapping plates, wood supports, staples and glands, wood roofing; shieves of different sizes; wrought and cast iron; 200 fathoms 3½ inch round iron wire rope; smiths' bellows, smiths' tools, &c., &c.
For further information, apply to Capt. JAMES BENNETTS, the Manager, on the Mine; Mr. EDWARD TRYTHALL, the Purser, Penzance; or to the Auctioneer, No. 28, Clarence-street, Penzance.—Dated Dec. 17, 1877.

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MR. A. BERRYMAN has been instructed to OFFER FOR SALE, BY PUBLIC AUCTION, on Tuesday, the 15th January next, at Eleven A.M., at the PROVIDENCE MINES, in Lots to suit the convenience of purchasers, ALL THE

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THEREON, CONSISTING OF

ONE 40 in. PUMPING ENGINE, 9 feet stroke, with TWO 11 ton BOILERS and FITTINGS.
ONE 30 in. STAMPING ENGINE, 9 feet and 8 feet stroke, with TWO BOILERS, 19 tons, 2 fly wheels and wrought-iron shafts, 2 stamps' axles or 32 heads, with heads, lifters, &c.
ONE 23 in. WINDING ENGINE, double acting, 6 feet stroke, with TWO BOILERS, 10 tons and 8 tons, and whim cage.
ONE 20 in. MAN ENGINE, double acting, 6 feet stroke, 1 fly-wheel, 2 wrought-iron shafts, and ONE 8 ton BOILER and FITTINGS, balance bob, &c.
ONE heavy 10 feet diameter TOOTHWHEEL, with wrought-iron shaft, plunger blocks and brasses.
ONE 6 in. HORIZONTAL ENGINE, 20 inch stroke.
BALANCE BOB at engine, with connecting rod, &c., complete.
Shaft tackle, with 10 feet shieve; 20 fms. 4 in. pumps; 50 fms. 5 in. pumps; 40 fms. 6 in. pumps; 40 fms. 7 in. pumps; 60 fms. 8 in. pumps; 60 fms. 9 in. pumps, and 20 fms. 15 in. pumps; windboxes; H and doorpieces; pole cases; balance bob, connecting rods and travelling wheels at main engine; strapping plates; six pulverisers; 3 tubes in dry; cañiner and water-wheel; a capital weightbridge (weighing up to 10 tons), and house; round bobbles and gearing; machine and hand frames; sundry water-wheels, from 8 to 14 ft. diameter; steel wire rope; railroad iron; double-power crab winch; tin kieves, tin chests, wood roofing, launders, 3 smiths' bellows smiths' tools; miners' tools; 1 lathe (wood bed), and carpenter's tools; beam and scales, capstan rope, two good dials, old wrought and cast iron; and numerous other articles in connection with working an extensive tin mine.
Further particulars contained in an inventory on the mine.
Also, the RICH TIN LEAVINGS throughout the mine, being the accumulation of many years, during the greater part of which this has been one of the largest tin-producing mines in the county.
For further information, apply to Capt. HOLLOW, the Manager, on the mine; EDWARD TRYTHALL, the Purser, Penzance; or to the Auctioneer, 28, Clarence-street, Penzance.—Dated Dec. 21, 1877.

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IMPORTANT AND UNRESERVED SALE OF VALUABLE PLANT AND MACHINERY.

MR. D. T. ALEXANDER has been favoured with instructions from the Loftus Iron Company (Limited), of Middlesbrough, TO SELL, BY AUCTION, at the above colliery, on Wednesday and Thursday, January 9th and 10th, 1878, the whole of the

VALUABLE PLANT AND MACHINERY

Used in sinking their pits at Llanttrissant, comprising an excellent and nearly new PAIR of VERTICAL WINDING ENGINES, with upright BOILER, drums, and pumping gear complete, by Westley and Forrester, of Barrow-in-Furness; a very capital and nearly new MORTAR MILL, ROLLERS, and PAN, 9 ft., with 7-horse power VERTICAL ENGINE and BOILER; "Universal" 7 in. STEAM PUMP, by Hayward Tyler, of London; punching and shearing machine, by John Cameron, of Manchester; new patent Guibal ventilating fan, 30 ft. diameter, 10 ft. wide, together with a vertical engine, fitted with expansion gear by the Grange Iron Company, of Durham, which has never been fitted together for use; Cornish boiler with galloway tubes, 15 ft. by 5 ft., by Westley and Forrester; air compressing engine, fitted with two of Ball's patent rock drill 8 x 15, by Robey, of Lincoln; circular saw bench, by T. Robinson and Son, of Rochdale; 12 ft. bed sliding and surfacing gap lathe, by Illingworth, of Leeds; three 18 x 22 in. ventilating fans, 50 coal trams, 2 ft. tin gauge, fitted with steel axles and wheels, about 35 tons of permanent and temporary rails, 75 and 39 lbs. to the yard respectively; about 1 ton of railway chairs, several sets of pumps, and piping of various sizes, wooden kibbles for sinking shafts and water wheels, weighing machines, screw and hydraulic lifting jacks, a large quantity of Davey's safety lamp, Hardy's patent steel picks and shafts, two sets of stocks, taps and dies, anvils, and blacksmiths' bellows and tools, double and single purchase crab winches, by R. Mitchell, of Cardiff; pair of new timber wheels, three 2-yard tipping wagons, three tip carts, quantity of timber in bulk, about 6 tons of good pitwood, &c., &c., together with a general assortment of stores too numerous to mention.
Also a quantity of MINING INSTRUMENTS and the OFFICE FURNITURE, consisting of a Miner's safe, letter press and stand, deal desks, drawing boards, tables, chairs, fenders, &c.
Sale to commence each day at 11-30 A.M., being immediately after the arrival of the 10-45 A.M. train from Cardiff.
The Auctioneer desires to intimate that the plant and machinery is in every respect in good condition, the greater portion of it having never been used.
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Catalogues are being prepared, and in the interim full particulars may be obtained of the auctioneer.
76, St. Mary-street, Cardiff, Nov. 30th, 1877.

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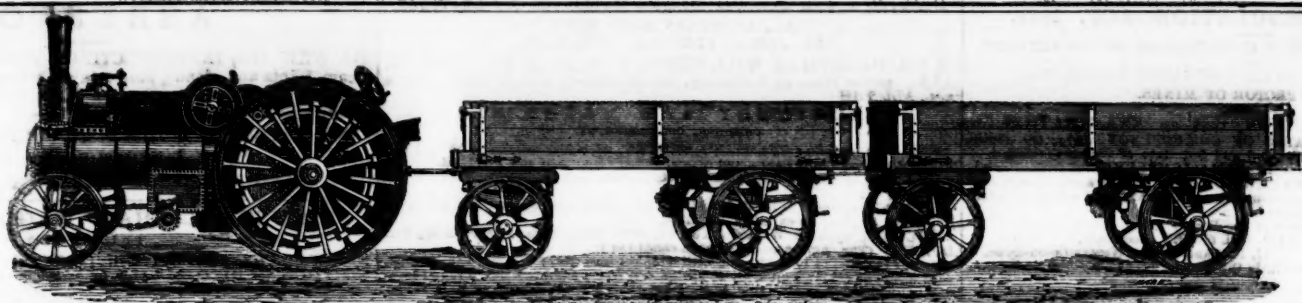
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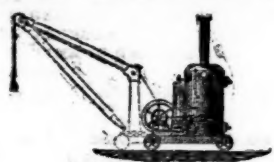
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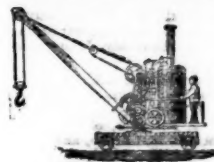
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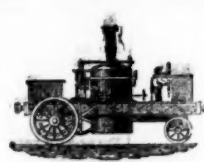
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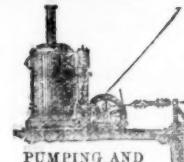
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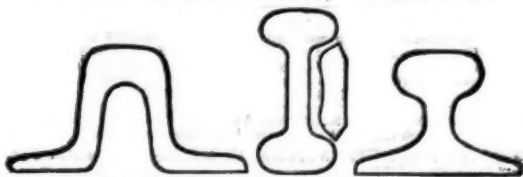
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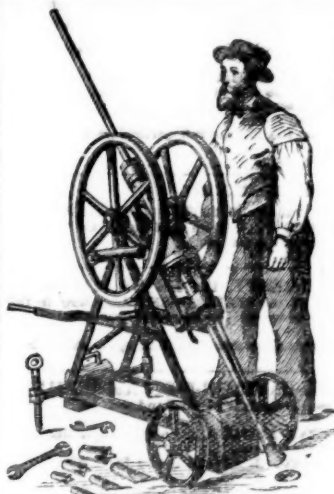
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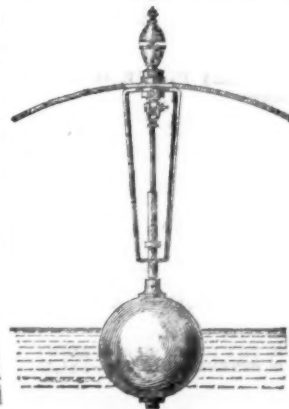
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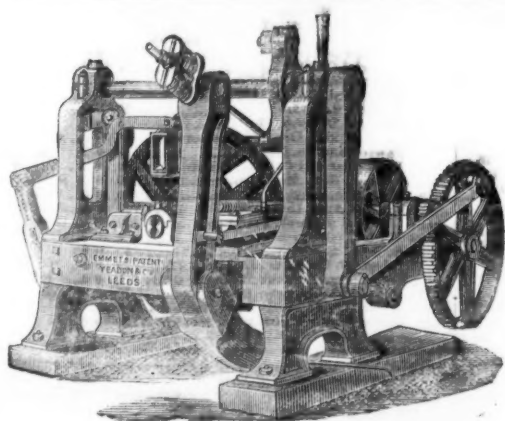
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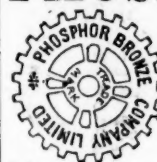
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